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The Chemical Age

VOL. LXIII 2 DECEMBER 1950 No 1638

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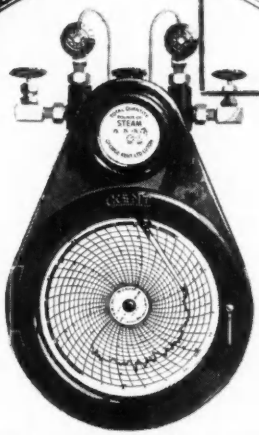

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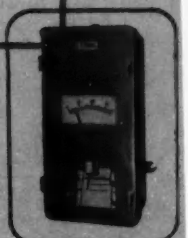

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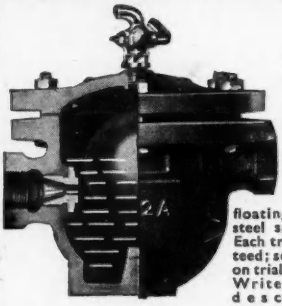

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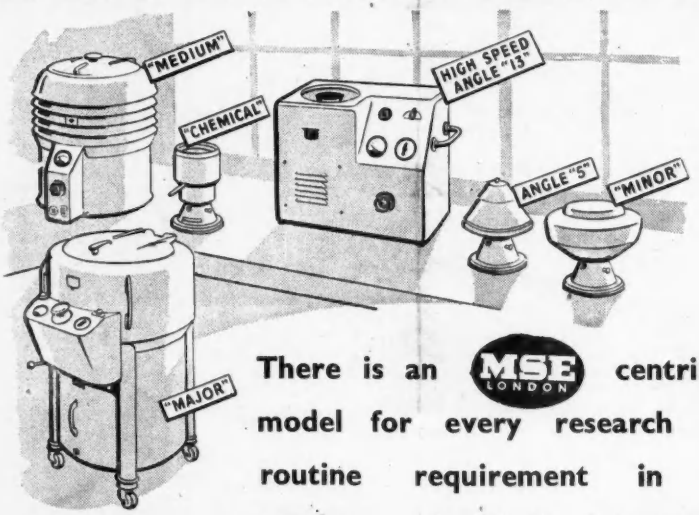

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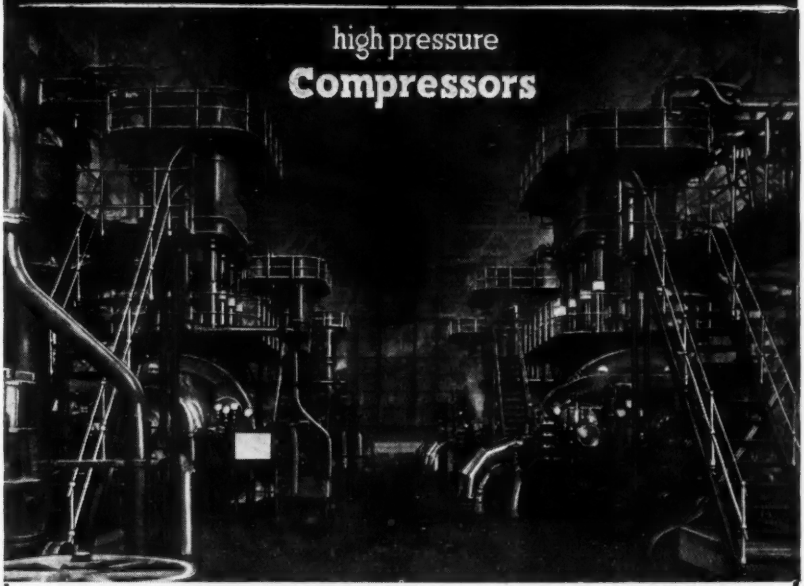

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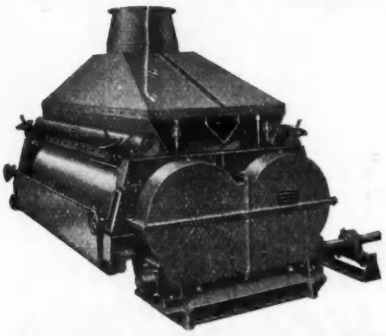

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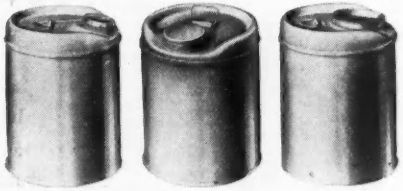

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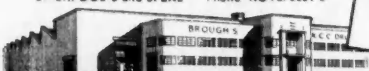

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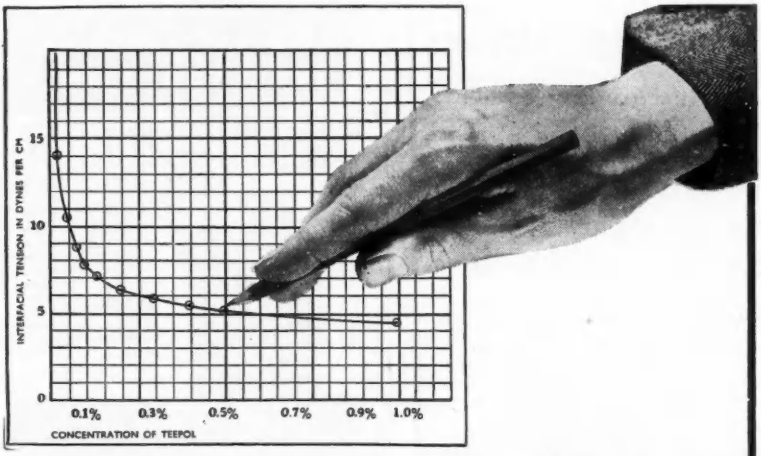

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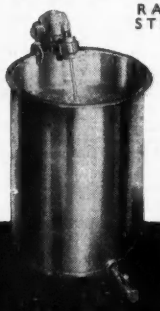

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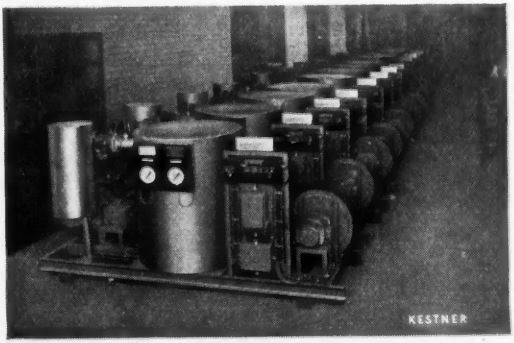

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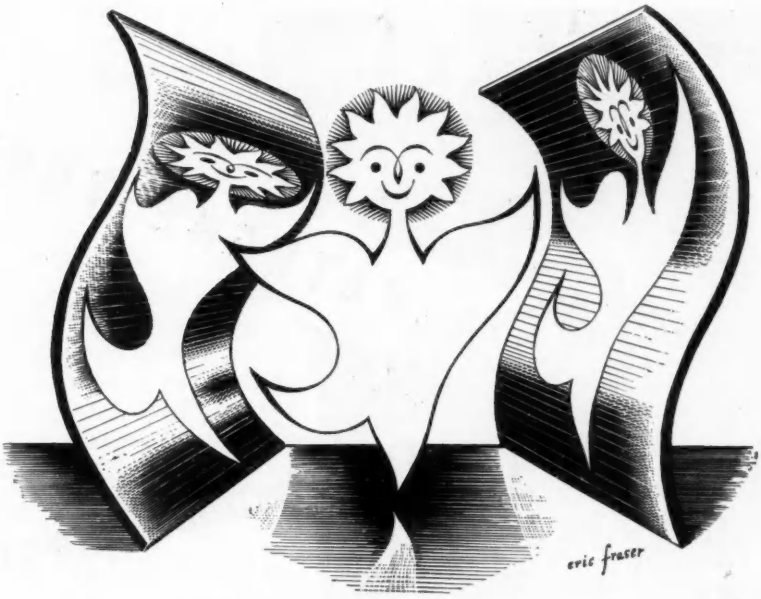

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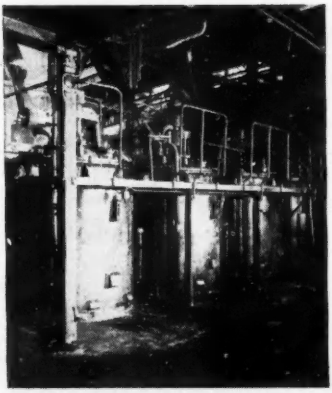

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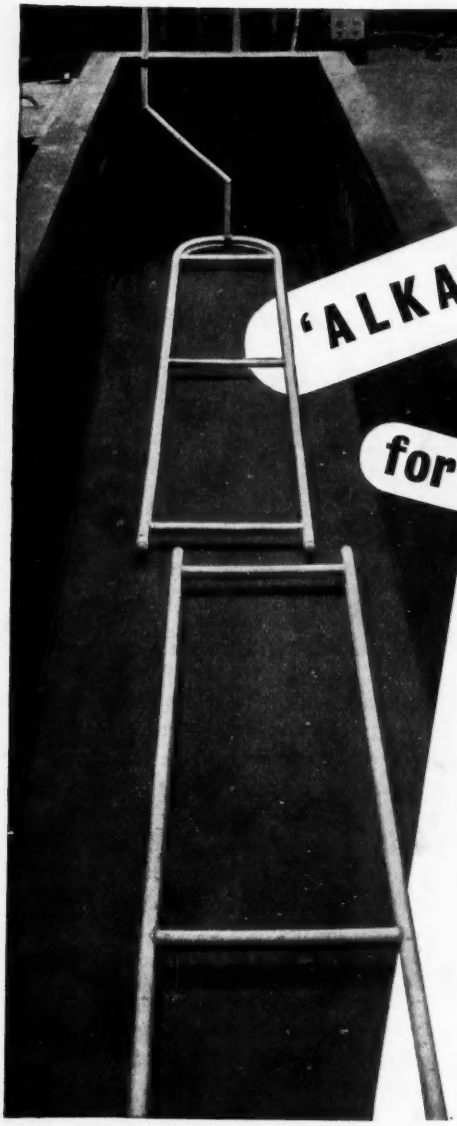

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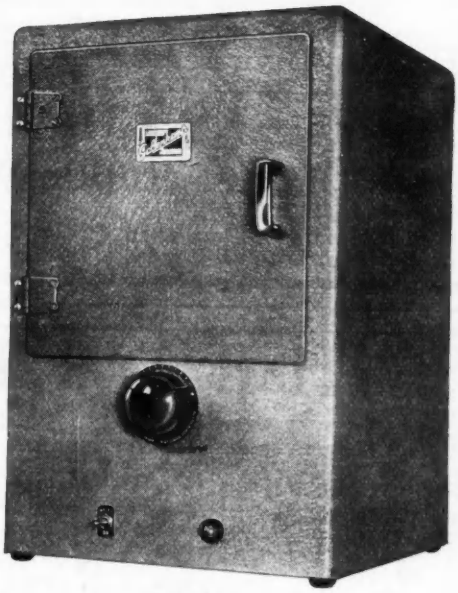

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Volume LXIII 2 December 1950 Number 1638

Industry's Coal Needs

THE incoherence and unpreparedness of national direction of the coal industry has again been painfully underlined by the recent revelations of the imminent return of shortages. The news, treading unceremoniously on the tranquil, though belated, 15-year "Plan for Coal" by the National Coal Board, has necessarily revived uncomfortable recollections of long periods of rationing and empty coal bunkers during the years immediately after the war. Then, lamentable confusion was produced soon after by vacillating Government policy to avert the worst consequences to industries, of which the large bulk producers of chemicals were conspicuous victims, of having failed to raise enough coal for domestic needs, industrial steam-raising and the coal converting retorts.

Having no policy giving any certainty that coal production could be increased to match the needs of reviving peace-time industries, the Government virtually joined in what was then called "the flight from coal" by strongly encouraging industries to undertake the costly conversion to oil burners. Many of those who accepted that recommendation had good reason to regret having placed confidence in the people whose authority should have been entirely reliable. Within a few months, it became clear that oil, like coal, would not be forthcoming on the scale the new plants would require.

All this, fortunately, belongs to the past. Yet the recollection of these things and in particular the losses of several thousand pounds incurred when the coal to oil conversion proved to have been no more efficacious than a charm to ward off fuel famine, does not permit any firm confidence in what is now being proposed. The "Plan for Coal" has no application to present problems; its first effects, should it be implemented, would not be felt until 1961. Meanwhile, mine production this year has failed so completely to fulfil the proposals for abundance, made at intervals since 1949, that the country has once more to resort to buying foreign coal—some admittedly for re-sale—and a hard winter might easily result in empty coal bunkers in the factories and more stringent rationing in the home. After nearly five years of plans and counter plans, the "coal problem" has proved by its vigorous reappearance that none of the specifics prescribed so far has done much more than to provide temporary relief.

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It would be unreasonably defeatist to condemn the latest addition to the "coal plans" as just another substitute for a satisfactory performance of the job of raising coal and getting it in sufficient quantity to where it is needed. It differs from some of its patchwork predecessors in proposing fundamental changes on the grand scale. It will involve the reconstruction of "probably over 250" of the 950 existing collieries to enable fewer miners to produce about 120 per cent of the present coal yield, and it will regrettably cost £635 million between now and 1965.

The efficacy of all this cannot be proved until ten or more years have passed. In the meantime the shortage is pressing, as near perhaps as the first months of 1951, and long-term planning is not an acceptable substitute for some means of securing full adequacy in present conditions. There is, in fact, at hand a means by which the recurrent deficiency between what industry needs and what it gets could be very greatly reduced. That could be done by making practicable some of the technical advances in coal using, about which so much is heard and so little done. All the experts have pleaded the need, and many have described the means, to save many millions of tons of coal each year by raising the efficiency of coal burning. The vast scope for improvement is suggested by the estimate—by the director of the Fuel Research Station—that average efficiency of utilisation of fuel and power resources here is well below 20 per cent. Industries' readiness to better that figure, and so reduce the mounting budget which material and labour costs continually inflate is not in doubt.

The Government's contribution to this very desirable end, apart from the money it allocates to the Fuel Research Station, has so far been trivial. Even more shortsightedly, it has doggedly retained the large purchase tax on full economising equipment. At last (on November 25) there is evidence, contained in the Minister of Fuel's mention of "a big fuel economy campaign", that an obvious need is to receive some attention. By facilitating the use of better coal burning equipment, and not only in factories, the Government could deprive the fuel problem of much of its sting—without waiting ten years, at a cost very much less than £635 million.

Notes and Comments

Limiting Acid Supplies

SULPHURIC acid is vital to the maintenance of a healthy economy of Great Britain. Few are likely to overlook that axiom—nor the fact that H_2SO_4 is becoming dangerously scarce. Considerable reductions have been made in the allocation of sulphuric acid, which affect all industries. Fertiliser manufacturers, however, have taken the severest cut. They now have to make shift with only half their former allocation. That is a double misfortune, because the producers of superphosphate could, in fact, have used more than they were actually getting at the time when restrictions were imposed. The effect of this reduction in the supply of sulphuric acid is that the output of superphosphate fertilisers in Great Britain is likely now to drop to 75 per cent of what was being produced a few months ago. As a remedy, the Government may have to buy superphosphate fertilisers abroad; not a very satisfactory alternative, particularly in view of present economic commitments.

No Way Out

BECAUSE the future supply of U.S. sulphur is problematical (THE CHEMICAL AGE, *63*, 737) there does not seem to be much hope of improving the supply of sulphuric acid to industry without resorting to the purchase of sulphur from other countries. Italy, from whom Great Britain bought a sizable quantity of Sicilian sulphur prior to 1939, is stated to have sulphur to sell. Some countries are buying it. But the price is said to be over twice as much as that of U.S. sulphur, and the quality to be rather inferior. In any case, it is doubtful whether the amount of Italian sulphur available would even assuage Great Britain's present pressing need. Only a quick appraisal of this country's difficulties by the U.S.A., followed by immediate action to permit an increase in allocations of sulphur can avert what promises to be an acute shortage of vital commodities—and not only superphosphate—early in 1951.

Sulphur—and Inflation

APORTENT of what may be in store for British Chemical manufacturers next year should the threatened cut in sulphur imports, materialise is given in the announcement on November 24 by a leading chemical firm that "there has been a big increase in the price of lactic acid on account of the shortage of sulphuric acid." Thus, without being unduly pessimistic, it seems more than likely that, unless an adequate supply of sulphur is quickly made available to Great Britain in 1951, this notification of price increases is but the forerunner of many which must inevitably ensue from the shortage of such an important basic chemical as sulphuric acid. Coming at a time when the economic burden of Great Britain is already staggering, any increases in the costs of important chemicals will aggravate considerably the present upward trend in the cost of living index.

Plastic Films

IN 1939 Cellophane was freely available in the U.K. In 1950, British users are getting only a very limited amount and at a cost 75 per cent greater than pre-war. Orders for Cellophane are, in fact, being taken, but 12 months will elapse before delivery. While demand is, of course, much greater than production, this is not the main reason for the current stringency. British export policy appears to be the cause. The imperative national need for hard currency and dollars is forcing British manufacturers to sell most of their Cellophane abroad. Thus, the relatively small amount of Cellophane available for home consumption reflects another example of the sacrifice of British manufacturers' wants at the altar of economic expediency. But there is a brighter side. Alternative materials

are being developed which are finding great favour among those who wish to eke out their supply of Cellophane. The relatively new Pliofilm, processed by Goodyear from chlorinated rubber, is now being used in very large amounts. Recent expansion of production has, indeed, been unable to keep pace with demand. It was unfortunate that this boom should have occurred at a period when natural rubber is attaining price levels never normally approached in peace time—4s. 10d. per lb., which represents a three-fold increase over the immediate post-war price, and is five or six times greater than that of 1939. The price of chlorinated rubber film has fortunately not followed that of rubber to anything like the same extent. The shortage of Cellophane, like those of other "essentials", may, after all, have its consolations. Necessity is spurring British manufacturers to seek alternative materials. Pliofilm is one of the results of their research. It is possible that many other useful and novel stuffs may be developed as a consequence of the scarcity of conventional substances.

Father of Nuclear Physics

AN appeal for British scientists to support a fund to enable the work of Lord Rutherford to be adequately commemorated was launched by the Royal Society on St. Andrew's Day. Lord Rutherford, one of the greatest scientists of the 20th century, was born in New Zealand in 1871. He was awarded an 1851 Exhibition scholarship at Cambridge, where, under Sir J. J. Thomson, he was the first person to be accepted as an advanced student in work which permitted the granting of degrees of research. Lord Rutherford's investigations, which led to practically all that is now known of the structure of atoms, fell into three stages. He developed the theory of the atom in Montreal; the final convincing proof he provided at Manchester, and through his investigations of the structure of the nucleus itself, he founded in the Cavendish Laboratory, Cambridge, the modern science of nuclear physics. Men of the genius of Rutherford create by their achievements a memorial which lives after them, but nevertheless it is fitting that public homage should be paid to the memory of a great man, especially in some suitable method which helps others to continue his work. By his personality and leadership Lord Rutherford inspired others to achievements which they could not have reached alone. The proposed memorial by the Royal Society is to take two forms: Rutherford Scholarships tenable for three years, to be awarded to post-graduate students within the British Commonwealth, for research in the natural sciences with a preference for experimental physics; a scholar will normally be required to carry out his research in an institution in some part of the British Commonwealth other than that in which he graduated. A Rutherford Memorial Lecture to be delivered at intervals at selected university centres in the British Commonwealth overseas, at least one in three to be given in New Zealand. It is also proposed to arrange for the collection, arrangement and binding of copies of Rutherford's correspondence, and its preservation in safe custody for future reference. Such a scheme would indeed prove a worthy and enduring tribute to the "Father of Nuclear Physics" and deserves a generous support.

Scientific Council for South Africa

THE newly formed African scientific body, the Scientific Council for Africa South of the Sahara, is composed of 13 scientists from the United Kingdom and the Colonies, South Africa, Southern Rhodesia, France, Belgium and Portugal.

Dr. E. B. Worthington has been appointed secretary-general and the United Kingdom will be represented by Sir Alexander Carr-Saunders, chairman of the Colonial Social Science Research Council.

The functions of the new council will be: To suggest new subjects for research and how to set about them, to link in friendly liaison, existing scientific bureaux, to facilitate the transfer of scientific workers from one territory to another, and to suggest to the Governments concerned such specialist conferences as may advance the interests of Africa.

CHEMICAL IMPORTS RISE

October Total Over £1m. More Than 1949

IMPORTS of chemicals, drugs, dyes and colours in October were again marked by a substantial increase, the total value of £3,241,397 being over £1 million more than the corresponding month of last year and £388,670 higher than in September. Notable increases compared with a year ago were: Boric acid £10,667 (£5802); fertilisers £205,878 (£1104); sodium compounds (excluding sodium nitrate) £174,298 (£111,656); synthetic organic dyestuffs £137,078 (£54,927); and carbon blacks £338,953 (£188,078).

Decreases, as shown in the *Trade and Navigation Accounts of the United Kingdom*, from which the following data are abstracted, included potassium compounds £632,003 (£682,591), and gas and chemical machinery £20,494 (£320,936).

	October, 1950	October, 1949
Acetic anhydride	Cwt. 2,072	Cwt. 4,117
Boric acid	3,900	2,801
Carbolic acid	5,447	—
Value of all other sorts of acid ...	£65,173	£47,295
Borax	Cwt. 19,058	Cwt. 14,400
Calcium carbide	26,594	—
Cobalt oxides	536	271
Fertilisers	Tons 22,710	Tons 35
Glycol ethers and glycol ether-esters	Lb. 559,274	Lb. 308,241
Iodine	—	—
Potassium chloride	Cwt. 772,687	Cwt. 767,165
Potassium sulphate	14,080	78,200
All other potassium compounds	13,754	2,868
Value of all potassium compounds	£632,003	£682,591
Sodium nitrate	Cwt. 50,000	Cwt. 99,530
All other sodium compounds ...	26,589	4,741
Value of all sodium compounds	£174,298	£111,656
Value of chemical manufactures, etc., all other sorts ...	£970,169	£479,782
Synthetic organic dyestuffs ...	Cwt. 1,596	Cwt. 479
Extracts for dyeing	4,836	425
Extracts for tanning (solid or liquid)	50,765	54,198
All other dyestuffs	182	369
Earth colours (except black) ...	24,699	7,858
Carbon blacks (from natural gas)	85,399	41,116
Value of carbon blacks ...	£338,953	£188,078
Other blacks, including vegetable, lamp, acetylene and bone	Cwt. 14,306	Cwt. 2,215
Value of paints and extenders ...	£447,825	£250,368
Value of chemicals, drugs, dyes and colours	£3,241,397	£2,003,915
Essential oils (other than turpentine)	Lb. 591,088	Lb. 483,623
Value of essential oils	£546,804	£289,495
Synthetic oils	Lb. 5,397	Lb. 4,005
Mineral jelly	Cwt. 17,637	Cwt. 6,209
Wax, petroleum: paraffin wax	35,559	57,061
Value of oils, fats and resins ...	£10,653,165	£8,835,327
Aluminium oxide (crude, unground)	Tons 2,582	Tons 847
Silicon carbide (ground or graded)	842	484
Asbestos, raw and fibres ...	10,303	8,414
Diatomaceous earth	5,478	2,582
Graphite (plumbago) natural and artificial	589	430
Magnesite	2,695	1,349
Sulphur	36,227	36,270
Value of sulphur	£360,223	£316,248
Value of non-metalliferous mining and quarry products ...	£1,631,034	£1,170,887
Gas and chemical machinery ...	Cwt. 665	Cwt. 28,836
Value	£20,494	£320,936
Plastic materials	Cwt. 15,773	Cwt. 14,705
Value	£443,657	£451,162

Service to Steel Industry

THE Iron and Steel Institute's Sir Robert Hadfield Medal for 1951 has been awarded to MR. WILLIAM BARR, of Colvilles, Ltd., president of the West of Scotland and Steel Institute, for his contributions to research in steelmaking.

The Bessemer Medal for 1951 has been awarded to MR. BEN FAIRLESS, president of the United States Steel Corporation, for his services to the industry. Presentations will be made at the annual meeting in London in May, 1951.

DR. C. H. DESCH, F.R.S., past president, has been nominated an honorary member of the Iron and Steel Institute.

2500 More for Chemical Industries

AN increase of 2500 in the number employed in chemical industry was recorded in August compared with the previous month. The total (in thousands) was 449.1 compared with 446.6 in July. Detailed distribution (the *Ministry of Labour Gazette*, Vol. 58, No. 10), included: Coke ovens and by-product works 17.2 (16.7 men, 0.5 women); chemicals and dyes 205.1 (152.0 men, 53.0 women); explosives, etc., 36.5 (22.3 men, 14.2 women); paint and varnish 39.0 (27.7 men, 11.3 women); soaps, glycerin, etc., 49.7 (29.3 men, 20.4 women); mineral oil refining 36.2 (30.1 men, 6.1 women).

NUCLEAR REACTORS

Information to Help Training

RELEASE of some atomic information which would not be of material assistance to other nations in the development of military applications of atomic energy has been agreed upon by Britain, Canada and the United States.

The technical information now to be published includes details of existing piles and formulæ of nuclear constants of uranium. These will help in the instruction and training of technicians and scientists and thus contribute to the development of atomic energy for peaceful purposes.

Full particulars will be given of Gleep, the smaller uranium and graphite pile or reactor at Harwell; Zeep (Zero energy experimental pile) a heavy water and uranium reactor at Chalk River, Ontario.

Data on U.S. Reactors

The four U. S. reactors concerned are:—

The uranium and graphite reactor erected under the West Stand of the University of Chicago's Stagg Field in 1942 and subsequently dismantled; this was in fact, the world's first nuclear reactor; a modified version of this, now located at the Argonne Laboratory, near Chicago. A uranium and heavy water reactor at Argonne; and a homogeneous reactor using enriched uranium and ordinary water at Los Alamos, New Mexico.

In addition, certain information will be released about Bepo (British Experimental Pile), the larger of the Harwell piles, and similar reactors in U.S.A. and Canada.

The information was released on recommendations of the Fourth International Declassification Conference, held at the Atomic Energy Research Establishment, Harwell in February. Like the three preceding conferences, this was a continuation of the war-time collaboration of the three nations. It recommended revisions to the Declassification Guide which is used by the three nations to determine what atomic energy information may be published.

Minor adjustments, some more liberal and others more restrictive, have been made in other sections of the guide. As hitherto, information will be released by issuing individual documents after reviewing according to established practice. Values of pertinent nuclear constants of uranium will be published in a special technical report to be issued by the Atomic Energy Agencies of the three Governments.

CHEMICALS FOR EXPORT

U.K. and European Surpluses

AFTER a period of six months, the Organisation for European Economic Co-operation (OEEC) has published a second book on the subject of the exportable surpluses of chemical products in the 18 participating countries (THE CHEMICAL AGE, *62*, 705). Actually, the information relates to all those countries which, up to the time of going to press with the book, had replied to the organisation's questionnaire. No reply was received from Portugal, and Iceland and Luxembourg have stated that they have no surpluses. The book is again printed throughout in French and English.

The U.K. and the Netherlands have not provided precise quantities of surpluses either at a given date or in the form of regular monthly estimates, but have again indicated whether the supplies for export were "limited," "adequate" or "ample" at the time the information was collected, which in the present instance was July.

Some of the figures and indications published may now be incorrect, on account of the rapidly changing international situation, and should therefore be considered as indicative only.

Britain's list of chemicals under the heading of "ample"—that is, of which all the export demand of which Britain is aware can be met as well as any reasonable additional demand—includes the following:—

Sodium fluoride; arsenical acids; tin oxide; mercuric oxide; tin tetrachloride; mercury chloride; bleaching solutions; magnesium sulphate; aluminium sulphate; copper sulphate; chrome alum; sodium nitrate; mono-ammonium phosphate; arsenates; sodium carbonate; sodium bicarbonate; bichromates; mercury compounds; chloroform; carbon tetrachloride; ethylene dichloride; nitrobenzene; methyl alchohol; fatty alcohols (except lauryl alcohol); sulphonated fatty alcohols; pentaerythritol; xylenols and higher phenolic substances; ethyl ether (sulphuric ether); formaldehyde; metaldehyde; methylal; lactic acid; tartaric acid; dibutyl, dimethyl and dioctyl phthalate (limited quantities at present, ample later); trichloroethyl phosphate; aniline oil, aniline and its derivatives; *p*-phenylenediamine; *m* and *p*-toluylenediamine; urea; organo-mercural compounds; penicillin; glandular extracts; dental filling materials; tannic acid and natural tannins; various synthetic tanning products; inks; putties; gelatin; glues; arsenical products (insecticides, etc.); sulphur products; mineral and vegetable oil products; insecticides with vegetable base (based on nicotine, derris, rotenone, pyrethrum); rodenticides; disinfectants based on phenols and their derivatives, DDT; sheep and cattle dips; synthetic growth regulating substances; synthetic detergents; emulsifiers; dye thickener; matting agents and optical bleaches; foundry core binders; chemical fluxes and die dressing for foundries; synthetic waxes and chemically modified natural waxes; celluloid; celluiose acetate; metacrylics.

COMMONS QUESTIONS

Fumes and Effluents Discussed

NO experiments on the underground gasification of coal have yet been made in Scotland according to a written answer made by Mr. P. Noel-Baker, Minister of Fuel and Power. Short-term experimental work was in progress near Chesterfield, but no decision could yet be taken to extend it to other sites.

IMPORTANCE of maintaining sufficient metal supplies to manufacturers was recognised by Mr. G. R. Strauss, Minister of Supply, in a written reply to questions. Every effort was being made to obtain adequate supplies of non-ferrous metals but this country was mainly dependent on imports and there had been a considerable increase in world demand. Steel supplies were good, but the Korean war and the rearmament programme had resulted in some delay to supplies.

IN reply to a question about the alleged storage of copper wire originally intended for China, the export of which was now forbidden, Mr. G. R. Strauss stated that no such storage had, in fact, occurred. The question of its diversion to home use did not therefore arise.

Fluorine Fumes

THE prohibition of discharge of fluorine fumes from factories in Scotland was raised by Lord Malcolm Douglas-Hamilton. Replying, Mr. Hector McNeil, Secretary of State for Scotland, said that at an early date he would be able to introduce a Bill to amend the Alkali, etc., Works Regulation Act, 1906, in its application to Scotland.

TO WHAT extent synthetic fibres were now being manufactured in this country as a substitute for wool was asked by Lt.-Col. M. Lipton. Several synthetic fibres could be used for blending wool replied Mr. H. Wilson, President of the Board of Trade, rayon staple fibre being the most general. Production of protein synthetic fibres was at present only on an experimental scale, but one plant should be in commercial production early next year.

QUESTIONED about radioactive effluent discharged into the river Thames from the Atomic Research Establishment, Mr. A. Bevan said that there was a wide margin of safety. The conditions regarding the amount of effluent discharged were determined on the advice of the Medical Research Council.

A CHEMICAL CENTENARY

Service to Analytical Chemistry

A MEDAL awarded to Hopkin and Williams, Ltd., for its exhibit of fine chemicals at the Great Exhibition of 1851 served to recall, in London last week, the company's distinguished record of service to analytical chemistry. The relic was shown by Mr. G. E. Howard, partner and director, who proposed the health of the guests at a centenary dinner, attended by many distinguished figures of pharmaceutical and industrial chemistry. He gave an entertaining commentary on the company's vigorous growth since 1850 as universal suppliers of fine chemicals and reagents.

Victorian Development

The significance of the anniversary was referred to by Dr. L. H. Lampitt (Imperial College), who proposed a toast in honour of the company. He recalled that Hopkin and Williams was almost a contemporary of the Chemical Society (founded in 1845) and now bore witness to the Victorian period of great development of chemical industry. Sir William Crookes had been one of the firm's advisers around the time it exhibited at the Great Exhibition. Its name on reagent bottles was for many their first impression on starting laboratory work. Many names had since come and gone, but Hopkin and Williams remained and to-day earned feelings of respect, thankfulness and reliance. Past work in the laboratories of Hopkin and Williams had been an essential factor in permitting the great advances in science and technology. Workers in industry and the universities depended upon such firms as this " to establish the advance camps."

Team Work

In his reply to the toast, the chairman of the company, Mr. J. E. C. Bailey, made cordial recognition of the long and devoted work of many of the staff and executives. There were many who, like Mr. Geoffrey Howard, had already spent 50 years with Hopkin and Williams. They were a magnificent team.

Sir Harry Jephcott, who spoke for the guests, recalled the firm's close links, in an era abounding in great men, with the early foundations of modern chemical industry. It had set up at the start a standard of purity from which it had never departed. He wished it another century of service as successful and epoch-making as the last.

Anti-Corrosive Pigments

Coated Granular Materials Described in German Literature

PIGMENTS consisting of inert particles coated with anti-corrosive colouring agents, the "Kernpigmenten" in Germany, are the subject of a recent report by B. F. H. Scheifele (*Farben, Lacke, Austrichstoffe* 1950, November, pp. 414-7).

B. H. F. Scheifele was the inventor of these pigments for which a patent application was made in 1936 (Sch. 110, 103) and he discusses recent developments in this field, including some of his own work.

The original patent claimed a method for production of pigments consisting of inert particle substrata coated with weather- and corrosion-resistant metallic compounds, such as lead salts, as colouring matter. This is said to be analogous to electroplating and is an effective and economical way of using fillers, for which numerous materials are available, including aluminium and barium compounds and silicon carbide.

Coating the Particles

Various methods may be employed for coating the particles, e.g., precipitation, condensation from the vapour phase, electro-coating, fractional mixed crystallisation, or mechanical means. Special mention is made of a suspension of barium sulphate in a lead salt solution, which is used for deposition of the lead as carbonate by reaction with ammonium carbonate. After drying the resulting powdered product, the insoluble lead salt coating is oxidised to red lead by heating. The addition of colloidal material to form a gelled medium is desirable.

Other recent developments noted include electrochemical methods and the earlier work of H. A. Gardner, as disclosed, for example, in English Patent Nos. 455,717 and 455,762.

In Germany, J. K. Wirth (*Korr. u. Metallsch.* 1940, *16* (10) 331) and H. Wagner (*ibid.* 1944, *20* (8) 224, and *Archiv. Metallunde* 1947, 439-444) studied the anti-corrosive properties of the Kernpigments. Wagner used the electrochemical method of precipitation. He claimed that a lead pigment containing 8 per cent lead, superior to red lead as an anti-corrosive, could be obtained by this method. He suggested as ideal in this class of pigment the natural Veronese siennas of rhombohedric form. These consist of an inner dark-coloured nucleus of dolomite and iron carbonate and an outer layer of colourless, pure dolomite. He also found that the flake form of aluminium nuclear material was particularly favourable.

In his later work Wagner described four methods for the preparation of granular coated pigments: (a) Chemical: this is only applicable with flaked base material of easily oxidisable metals, e.g., degreased flaked aluminium powder with sodium chlorate or other oxidant. The method yields pigments of the Oxal type, with oxide layers remarkably reactive with fatty acids; (b) Colloido-chemical: in which, for example, lead salts may crystallise out on substrata of heavy spar, slate flour, or asbestin, but without complete envelopment of particles. It is preferable to use film-forming materials like the non-crystallising organic lead compounds soluble in hydrocarbons, for instance, tridocyl-lead $(C_{12}H_{25})_3$. This is soluble cold in hydrocarbons and hot in fatty oil. (c) Structural-chemical or morphological: mostly involving mixed crystals.

In the case of $BaSO_4$ and $PbSO_4$ there appears to be some doubt as to the precise nature of the mixing. Wagner therefore tried these two salts dissolved in concentrated sulphuric acid in order to obtain mixed crystals by gradual addition of water; but the method proved impracticable. (d) Electrochemical: in which base metals such as Al, Zn, Mg, are contacted with lead salt solution. A thin lead surface film is formed, and pigments of the Plumbal and Sigal type are produced, also Plumboxal by further processing. Adhesive properties were still further improved by electrolytic treatment, yielding electrolytplumbal.

American Work

Other more recent methods briefly noted include the roasting process, e.g., with blanc fixe (precipitated barium sulphate) iron oxides, slate flour, etc.; and also the double reaction method in paste form with a wide variety of materials. Finally the author mentions some American work in this field but no British, the former being represented by F. J. Williams and A. R. Pitrot (*Ind. Eng. Chem.* 1948, *40*, 1948-1950, Anon, *Chem. Engg. News* 1948, *26*, 3488-3490). This relates to a method of producing granular coated pigments in which a silica nucleus is coated with basic lead sulphate and silicate.

PYRETHRUM-IN-OIL INSECTICIDES

Their Biological Standardisation

IT is now something like a century since pyrethrum was introduced as an insecticide in Europe and the U.S.A. For most of that period it was used almost exclusively as a powder, but the value of kerosene suspensions of the ground flowers gradually became known for space sprays; the formulation "1 lb. of pyrethrum flowers per gal. of kerosene" became widely accepted. Some aspects of the production and application of pyrethrum-in-oil sprays for household and warehouse use have been reviewed by Dr. E. A. Parkin, of the Pest Infestation Laboratory, Slough, Bucks.

Staudinger and Ruzicka's work on the molecular structure of the pyrethrins paved the way for methods for the chemical estimation of pyrethrins in flowers. The accepted formulation for oil sprays was soon shown to be unreliable because of the variable pyrethrin content of different parcels of flowers, but chemical standardisation of the extracts was possible and is now widely practised.

Dr. Parkin points out that the present methods of chemical assay, satisfactory as they may be for commerce, need to be still more precise in the light of recent knowledge of the pyrethrin-cinerin complex before they can be expectd always to accord with the results of biological assay.

Unfortunately, biological assay is no more reliable than chemical assay, for it is difficult to maintain stocks of insects with anything like a uniform level of resistance. Nevertheless, with the complementary use of chemical and biological asays, the processors of pyrethrum flowers can now produce adequately standardised concentrated extracts which may be diluted as required.

Standardised Sprays

The biggest sale of pyrethrum-in-oil sprays is almost certainly of those for domestic use to control flies, and a high proportion of the sprays sold is standardised biologically by comparison with the official test insecticide of the National Association of Insecticide and Disinfectant Manufacturers, New York. This preparation is the only generally available standard for the biological assay of pyrethrins and contains 100 mg. total pyrethrins per 100 ml. of extract, that is 0.1 per cent wt./vol. pyrethrins, the solvent being a refined kerosene.

The NAIDM has also recognised the Peet-Grady chamber technique as its official testing method, using the housefly as the test insect, and has instituted a system for grading sprays according to their performance in comparison with the official test insecticide. A spray approximately equalling the test standard in knock-down and kill is termed Grade B and most reputable manufacturers of fly sprays aim at marketing a Grade AA spray, which may be expected to have about 0.14 per cent pyrethrins in it.

Assuming that, in practice, the spray is properly applied with due regard to the habits of the insect, about 25 ml. of test insecticide per 1000 cu. ft. of space will give reasonable control of the housefly and about 10 ml. per 1000 cu. ft. should suffice for mosquitoes; but there is no safety margin with a Grade B spray at these levels of dosage.

Tests with Houseflies

Ordinary household sprays containing pyrethrum alone may be expected, therefore, to contain 0.1-0.15 per cent pyrethrins in a deodorised kerosene, but their standardisation is related solely to a satisfactory performance against houseflies, and in biological assay the test flies are reared and exposed to spray under artificial conditions. Tests with houseflies do not ensure that a spray will control efficiently other common domestic pests such as cockroaches, crickets, beetles, silverfish, ants, fleas, etc. Under normal conditions of application, some of these insects can be controlled by a pyrethrum fly-spray, while others cannot. It is surprising that there seems to be no clear statement of the relative resistance of these insects to pyrethrum sprays, although a systematised and extended statement should be very helpful to manufacturers of household insecticides.

It would clearly be uneconomic to manufacture insecticides with different concentrations of pyrethrins for each insect, but consideration might be given to the possibility of marketing for control of the more resistant species a stronger solution than those at present available, which are designed as fly and mosquito sprays. A good spray should have a margin of effectiveness to allow for some inefficiency of application.

Since the war, the use of pyrethrum in

household sprays has undergone a notable change. The pyrethrins are still regarded highly for their rapid paralytic effect on many insects, but they have often been found unreliable in their lethal effect because of the eventual recovery of many paralysed insects. Pyrethrum is now included, therefore, as a knock-down agent for quick preliminary action in sprays depending for eventual kill upon the incorporation of one of the newer synthetic insecticides, which, except at relatively high concentrations, are slow in action. The concentration required in a fly spray is a minimum of 0.03 per cent total pyrethrins, preferably 0.05 per cent unless an activator for knock-out is present.

Purified Extracts

The popularity of the aerosol generator in the United States has given rise to new formulations for fly sprays involving specially purified extracts of pyrethrins to prevent the deposit of resins which might block the dispenser during storage or use. The dispensers usually contain sufficient 20 per cent pyrethrum concentrate to give about 1 per cent pyrethrins in the contents or about 0.4 per cent pyrethrins, if 3 per cent DDT is included. The concentration of insecticide in the mist remaining after evaporation of the propellent from the spray is normally from six to 16 times greater than the foregoing figures.

In the control of insects infesting stored products, especially foodstuffs, pyrethrum-in-oil sprays have been much used in Britain. These warehouse sprays contain about 10 times the concentration of pyrethrins and the carrier is a refined white oil with a viscosity only slightly less than that of medicinal paraffin. The use of a relatively heavy oil is necessary to comply with the fire prevention regulations.

Early in the war, stocks of foodstuffs, especially grain, had to be stored in Britain for unusually long periods, frequently in buildings not designed for the purpose and not capable of treatment by fumigation. When infestation occurred in such conditions the only insecticide suitable for spraying was pyrethrum. Such treatment could not normally be expected to eliminate the infestation because of the difficulty of reaching all the insects with the spray. Nevertheless, it helped materially to limit the severity and spread of infestation.

The spray employed contained 1.6 per cent wt./vol. total pyrethrins, the limit to the concentration being set by the cost of the pyrethrins, their acute shortage, and the risk of discoloration of goods. For this particular application the concentration of pyrethrins in warehouse sprays has been reduced slightly to the present figure of 1.3 per cent.

Dr. Parkin states that there is room for improvement in the toxicity and persistence of pyrethrum sprays for use against stored product insects. But the number of substances which might be added to pyrethrins for this purpose is severely limited by the necessity for avoiding those which are hazardous to man during application, or toxic on ingestion, or liable to give rise to off-flavours or discoloration of the products sprayed. Nevertheless, research is proceeding continuously, and already with some success, to discover substances having a good synergistic action with pyrethrins, so that mixtures may be compounded which are virtually non-toxic to man, possessing the outstanding knock-down effect of the pyrethrins, and having the lethal effect of the pyrethrins so strengthened that few affected insects are likely to recover from the stage of paralysis.

In the U.S.A. oil sprays are apparently little used against stored products insects, the outstanding recommendation for their application being in the control of insects affecting tobacco in store. In general, the number of concentrations of pyrethrins commonly used in oil sprays is very small, and in almost all instances the concentration has been determined experimentally as suitable for control of a particular species of insect under prescribed conditions. The maximum concentration, however, is determined by other considerations. The field of use of each concentration has been broadened without an adequate backing of experimental work and many claims have been put forward which, it is felt, would be difficult to justify.

Lethal Strength

In household sprays the best use of the pyrethrins is undoubtedly formulating them with another more lethal insecticide while ensuring that the concentration of pyrethrins is quite adequate to cause quick knockdown. In warehouse oil-sprays, more lethal agents than the pyrethrins cannot at present be used, except under very restricted circumstances. Until new insecticides are discovered which have a greater differential in toxicity between mammals and insects, some improvement can perhaps be expected from the use of pyrethrins with relatively non-toxic activators to increase the lethal effect of the insecticide.

CITRACONIC ANHYDRIDE

Its Properties and Some Likely Industrial Uses

From A CORRESPONDENT

CITRACONIC anhydride is formed by molecular rearrangement of itaconic acid. This can be made from the tribasic aconitic acid by the loss of carbon dioxide or directly from citric acid. Citraconic anhydride is also easily prepared by the distillation of citraconic acid (Crasso Ann. 34, 65, 68 (1840)) and it can also be made from the isomers of itaconic acid, by heating itaconic anhydride, or by heating itaconic acid or mesaconic acid.

The best known method of preparing citraconic anhydride is by distilling citric acid and aqueous citric acid under vacuum (Anschutz, Ber. 13, (1880): Ber 37,3970 (1904)). A German patent (678,985) taken out in 1939 describes a method of producing the anhydride from citric acid by distilling concentrated aqueous solutions of the acid under vacuum at 230° C. The distillation yields a mixture of citraconic and itaconic acids or anhydrides which can be separated and purified.

Although Baup first isolated citraconic anhydride as long ago as 1837 together with itaconic acid by distilling citric acid (Baup, Ann. 19, 29-38 (1837)) it is only within the last fifteen years that the anhydride has received any serious industrial consideration.

Properties

Citraconic anhydride is a liquid boiling at 213.5° C. at 760 mm. It freezes when cooled in ice and melts at 6° C. The anhydride hydrolyses in water more slowly than itaconic anhydride and is more soluble in organic solvents than either itaconic or maleic.

Citraconic anhydride reacts vigorously with primary amines and forms half esters with alcohols. With halogens it forms a series of halogenated chemicals by addition to the double bond, e.g., with chlorine in carbon tetrachloride the anhydride gives methyl dichlorosuccinic acid. Of particular interest is the discovery of Diels and Alder (Ann. 460,98 (1928)) who found that the conjugated system of citraconic anhydride adds to other conjugated systems. This enables the anhydride to be used to separate conjugated from non- or less highly conjugated compounds.

Ammonia reacts with citraconic anhydride vigorously to form ammonium citraconamidate and when the anhydride is heated in an autoclave with alcoholic ammonia at 108-110° C., methyl asparagin is produced.

Much interest has been shown in the polymerisation of esters of citraconic acid; the condensation of the anhydride with resin or terpinene to form useful resins; the reaction of citraconic anhydride with an olefin of the isobutenyl type to form resins, etc.

Industrial Applications

The most promising industrial uses likely to be found for the anhydride can be summarised as follows:—

1. Separation of azeotropic mixtures where one component is an alcohol. Although maleic anhydride can be used for a similar purpose, it is more difficult to regenerate and being a solid it is not so convenient to handle as citraconic anhydride.

2. Separation of conjugated from non- or less highly conjugated compounds, e.g., isolation of Vitamin D_2 from tachysterol formed during the irridation of ergosterol.

3. Formation of synthetic resins by polymerisation and condensation reactions. In 1934, du Pont patented a process for the polymerisation of esters of citraconic acid and combining the polymers with conjointly polymerised vinyl esters or styrene to give resins suitable for coatings (1,945,307) Another U.S. Patent discloses a method of making resins suitable for impregnating fabrics and for general moulding by reacting citraconic anhydride with compounds such as dimethylallyl ether compounds. A further U.S. Patent, 2,383,933, 1945, covers a method of making water—dispersible resins for sizing paper—pulp by heating resin or terpinene with citraconic anhydride to 150-160° C. together with water and an alkali carbonate.

4. Pour point depressants for lubricating or fuel oils can be made from citraconic acid according to American Patent, 2,412,708, 1946, by reacting it with various amines such as octadecenylamine and octadecylamine.

Cement and Concrete Research

Some Alternative Methods of Protection Against Erosion

THE Cement and Concrete Association is, broadly speaking, the information and concrete research organisation of the Portland cement industry in Britain. Originated in 1916 as the Concrete Utilities Bureau, the association was constituted in its present form to encourage the best possible utilisation of concrete and to find new and more efficient applications for the material. Shortly after the war it opened a research and development station at Wexham Springs, Stoke Poges, near Slough. This is divided into four sections, namely, chemical and physical, concrete, structures and development. Most of the time of the chemical and physical section is at present spent on service work for other sections of the station and in dealing with outside requests.

Chemical Attack

Samples of concrete which have deteriorated are frequently sent to the association for investigation. In some instances deterioration is found to be traceable to chemical attack by reagents such as acids or sulphates, the presence of which can usually be detected by chemical analysis. The association has accumulated a large amount of valuable information regarding the effects of reagents and effluents on concrete and is often able to offer advice when constructional problems of this type are encountered.

It is hoped that, in course of time, the research programme will provide more information on the structure of hardened cement, of which there is at present little precise knowledge. This subject is extremely complex because, by its very conditions of manufacture, cement is anything but a pure material.

Among the problems which have been investigated by the chemical and physical section is the erosion of concrete by soft acid waters. This problem is frequently encountered in the design of reservoirs in the North of England, where the water is run direct from hill streams into the reservoir before passing on to the waterworks. The investigation covered the use of all cements commercially available and trial concrete mixes were made with varying cement/aggregate and water/cement ratios.

The results of these experiments seem to warrant two conclusions. In the first place, alternative methods of protection are indicated; either the surface of the concrete must be completely covered by an impermeable film or the concrete itself must be made as impermeable as possible consistent with the strength required. The second conclusion is that the initial rate of attack on the concrete, if measured as a loss of strength, is approximately inversely proportional to the strength of the material.

Under the aegis of the association a training centre was started this summer at Wexham Place, a few hundred yards from the research station at Wexham Springs. Five-day courses are given to engineers and others on certain main uses and applications of concrete and the control and production of high quality material. Many of the courses are concerned more especially with pre-stressed concrete.

4800 H.P. for Cement Production

THE British Thomson-Houston Co., Ltd., recently received orders from Associated Cement Manufacturers, Ltd., for the supply of four 1200-h.p., 750-r.p.m. synchronous-induction motors and speed reducing gearboxes, to drive two cement grinding mills at 20.5 r.p.m. from a 3000-volt, three-phase, 50-cycle supply.

The motors are specially designed for operation at 0.95 leading power factor, thus compensating for the lagging power factor of other smaller induction motors used at the works. An efficiency figure of 97 per cent has been guaranteed. Starting a mill of this type demands 50 per cent above normal full load torque from the motor. The salient features of a synchronous-induction motor—high efficiency, leading power factor and high starting torque—are therefore all fully exploited in this application.

It is proposed to run the mills 8000 hours per annum, and 30 years' reliable service is demanded. This equipment should contribute to increased production of cement, now urgently required for the housing and general building programme at home and for export.

METAL GRIT FOR SAND-BLASTING

Advantages of Si:Mn Steel Over Quartz

IN recent years the application of silicon-manganese steel grit for modern sand-blasting has undergone considerable development. This is because the results obtained are appreciably better than when quartz sand is used; it is only necessary to magnify the grit particles about six times to confirm the excessive sharpness of the Si:Mn steel particles compared with those of quartz sand.

Natural materials such as quartz or river sand involve high transportation, drying and storage costs, since large quantities require to be stored. Thus, although sand is initially cheaper the balance greatly favours the steel grit.

The working period of the grit is claimed to be about 60 times that of quartz sand, due to its great hardness and resistance to wear. Its use obviates the need for large storage rooms and, because it is free from dust, dust removal systems are not required. Steel shot of the same material has globular grains which vary in size between 1 mm. and 6 mm., and is supplied in up to 8 grades, while the sharp-edged grit ranges from 10 to 12 grades.

The efficiency, as expressed by the ratio of the surface pressure on the work to the nozzle back pressure is approximately 10 per cent higher than with selected sands. That applies to both sharp-edged and globular varieties and is due to the greater specific weight of the granular metal over the natural sands, and the better utilisation of the energy of compressed air which that permits. Whereas quartz sand requires between 7 and 40 p.s.i. pressure, the most effective pressure range for the steel grit is between 14 and 40 p.s.i. with the finer grades, and between 40 and 85 p.s.i. for the coarser grades.

Surface Cleaning

A surface cleaned with the silicon-manganese grit or shot is slightly darker than with sand cleaning. This is due to a fine dust coat, which is easily removed by a stream of compressed air. A more firmly adherent coat is left by quartz. Apart from this, the appearance of the cleaned part is more uniform, while difficult sections are more easily handled.

The dross which results from the work is removed solely by the exhausters normally used with sand-blast plant, but without the need for special appliances. Even after long and continuous service, rust will not appear on the shot, provided that the regular oil and water separators in the compressed-aid line receive proper attention. Likewise the grit will retain the desired sharp edges and clean appearance. Recently the Si:Mn content has been increased so as to improve rust resistance. This does not affect the hardness. The cutting or grinding action of steel grit on the chilled-iron nozzles is only about one-sixth of that produced by natural sand.

Cleaning Hardened Tools

An example of the advantages of using grit is furnished by a firm engaged on cleaning hardened tools. Over a four-month period 650 lb. of steel grit was sufficient to do work for which about 6000 lb. of quartz sand was formerly required. Furthermore, when grit was used the sludge sump only required cleaning out twice during the four months, as compared with a weekly two-hour cleaning when sand was used. Daily replenishment of the grit took only a minute; on the other hand, replacing the sand occupied half an hour. The appearance of the finished parts was improved and the money saved by using grit was estimated at 13 per cent.

Still greater benefits were acquired in a foundry engaged on iron castings. An increase in output of 33 per cent was achieved because two revolutions of the rotary table sufficed with steel grit cleaning, whereas three rotations were necessary with quartz sand. In the tumbling barrel lay-out of a steel foundry, operated with four stationary nozzles fed by two compressors, the gain in output using steel grit amounted to 25 per cent. This was because, in an eight-hour day, the best grade of quartz sand could only clean 1800 lb. of 1 to 2 lb. castings, whereas the grit cleaned 4400 lb. and with a better finish.

Research has revealed that a nozzle bore of from 0.3 to 0.4 in. is about the best for steel grit, with working pressure of between 20 to 35 p.s.i. for fine grades, and from 40 to 55 p.s.i. for coarser grades.

Briefly, average consumption of grit amounts to 220 lb. compared with from five to six tons of quartz sand in providing the same service. The average space occupied is about 0.9 ft.^{3} Small bins located at one side of the blasting machines obviate all separate storage.

COMMERCIAL SUPPLIES OF ZIRCONIUM

Over 50,000 lb. Annual Production in U.S.A.

LARGE-scale production of zirconium metal has been initiated in a new mill at the U.S Bureau of Mines' Northwest Electro Development Laboratory at Albany, Oregon. At the recent National Metals Congress in Chicago it was disclosed that the whole of the current production, some 50,000 to 60,000 lb. annually is expected to be allocated to the United States Atomic Energy Commission. The metal's corrosion-resisting qualities indicate, however, that it will have widespread industrial uses, notably in the manufacture of instruments, and corrosion-resisting applications in chemical industry. Zirconium metal is now being produced in sponge, ingot, and sheet forms.

Production Problems

Many serious production problems had to be solved. Like titanium, melted zirconium is practically a universal solvent and either reduces or dissolves the refractory crucibles. For ductility it must be made by a process which excludes oxygen or nitrogen.

Ductile zirconium made by decomposition of zirconium iodide was first produced about 26 years ago by Van Arkel and his co-workers at the Phillips' plant in Eindhoven, Holland, and has been developed commercially in the United States by the Foote Mineral Company, Philadelphia, Pennsylvania. Zirconium metal has also been produced commercially in the United States by the Titanium Alloys Manufacturing Company, Niagara Falls, New York, and the Metal Hydrides Company, of Beverley, Massachusetts. At the Bureau of Mines the metal is obtained by reducing zirconium chloride with molten magnesium.

Zirconium Alloys

In addition to the commercially pure grades of the metal, scientists both in the United States and abroad are continuing to study the possibilities of using alloys of zirconium. Iron alloys of up to 5.5 per cent may be used in products when corrosion resistance is the objective and other metals are not suitable.

The chief problem in the treatment of zirconium ores has in the past been the decomposition of the silicate, and most processes described in the literature refer to the treatment of silicate. The methods of decomposition of the ores may be divided into the following groups:—

1. Volatilisation of silica by milling with carbon in an arc furnace. In 1937 and 1939, C. I Kinzie and D. S. Hake (United States Patents No. 2,072,889 and No. 2,168,603) patented methods for the thermal dissociation of zircon combined with the simultaneous preparation of either silicon carbide or zirconium carbonitride, using carbon resistor furnaces of the type employed for making silicon carbide. The treated product has to be roasted in air to obtain ZrO_2. Kinzie claims that in this way an oxide better than 98 per cent pure can be made from siliceous ore.

The acid treatment method, with HCl or H_2SO_4, requires the ore to be sintered with CaO at 1200°C., dissolved in HCl and precipitated to give $ZrOCl_2$ and H_2O from concentrated $CaCl_2$ solution. There are alternative methods.

Fluxing with alkalis is commonly used for making zirconium oxide for the enamel, glass, and porcelain industries which require a product containing some alkali; zirconate is produced in addition to silicate. F. Ullmann described the alkali-fluxing process in Germany in 1932.

Extraction Methods

Further alternatives are fluxing with sodium sulphate and sodium bisulphate and chlorination. Chlorination of the ore is said to provide marked advantages for the elimination of impurities, since iron and alumina can be excluded by precipitation of the zirconium as oxychloride, while the retention of silicon and titanium can be avoided by using a heated condenser. It has been proposed by L. Teichman and H. Martini (British Patent No. 520,740) to chlorinate the ore and to use the hydrochloric acid formed in the hydrolysis of the zirconium chloride to leach the undecomposed residues after a thermal treatment.

The most interesting zirconium alloys are those with copper, which are age-hardenable and good conductors of electricity; those with magnesium, which have good mechanical properties, high elongation, and excellent corrosion resistance; and those with iron and silicon, used as scavengers for steel and for grain control. In the United States alloys are chiefly with copper.

Metallurgical Section

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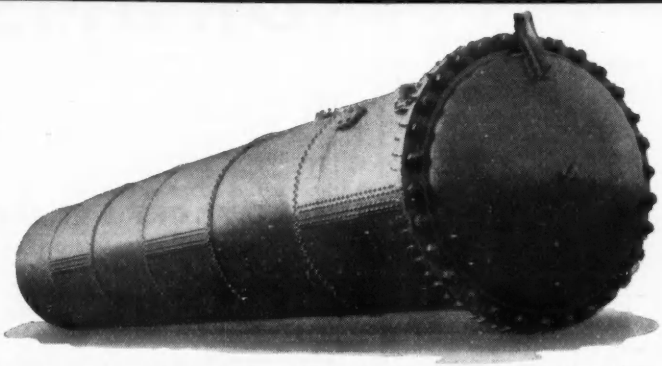

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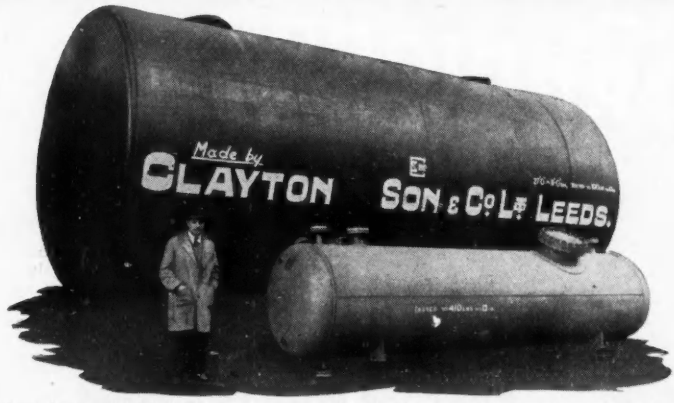

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Metallurgical Section

2 December 1950

ANTIMONY MINING IN SOUTH AFRICA

Planning for Largely Increased Yields

THERE has been a notable expansion since the war of antimony production in South Africa from 24 metric tons in 1938 to 4528 tons of concentrates in 1945. Production last year amounted to 7990 short tons of antimony concentrates and cobbed ore with an antimony content of 59.65 per cent. The Union is now the largest producer of this metal in the Commonwealth and the entire output is under contract to Britain.

Production is confined to the Murchison Range in the North-Eastern Transvaal, where a long and narrow belt of mineralised schistose rocks occurs in granite and gneiss. The feature of this belt is a mineralised zone, " the Antimony Line," which is characterised by antimony minerals. The most important of these is stibnite, but berthierite, tetrahedrite, corynite, chalcostibite and various oxides of antimony occur in minor quantities.

Although mineralisation occurs throughout the greater part of this line, only at certain localities have antimonial deposits of commercial value been found. These are mineralised lens-like irregular bodies, varying in width from a few inches to 20 ft.

Gold and Silver Content

All the antimony minerals contain some gold and silver and it was for their gold content that the reefs were originally worked. There have, in fact, been three distinct phases in the mining of Murchison ores. Originally the antimonial ores were worked exclusively for gold, reduction being complicated by the refractory nature of the ores. Then antimony was exploited as a by-product and now it might be said that antimony has become the main product and gold the by-product.

Antimony was mined in the Murchison Range as far back as 1913, when 48 tons of antimony sulphide were produced from ore assaying 12½ per cent stibnite and 7 to 8 dwt. of gold per ton. High prices for the metal, which for a short period actually exceeded £70 per ton, led to a considerable expansion of output during the first world war, production reaching its peak in 1916 with an output of 770 tons. Thereafter it rapidly declined and for more than 20 years was confined to small and sporadic outputs.

The Consolidated Murchison (Transvaal) Goldfields and Development Co., now the Union's main producer and exporter of antimony ores, was registered in April, 1934, and holds an area of 2745 claims acquired from smaller concerns previously operating in the Murchison Range, and some freehold land. During 1937, 10 stamps from one of the properties acquired were re-erected by Consolidated Murchison at its main plant for use in the production of antimony concentrates.

Expansion Programme

Throughout the last war, antimony was in such keen demand that Consolidated Murchison were able to embark upon a long-term programme of expansion. Additions to the antimony plant were made and the company now has two plants in operation, one of which is treating plain gold ores and the other antimonial ores from which a certain amount of gold is extracted. Metallurgical investigation and selection in mining have resulted in the production of an improved concentrate containing a higher percentage of antimony and less impurities. In view of the improved antimony extraction technique, there seems to be no reason why the antimony concentrates produced should not be capable of competing favourably against pre-war sources of supply.

The emphasis on antimony rather than gold production has been particularly evident since the war. In March, 1948, for example, milling amounted to 10,100 tons and the revenue from both gold and antimony totalled £41,776. Of this £34,000 was derived from the sale of antimony. As a result, taxation reliefs applicable to base mineral mining have stimulated Consolidated activity. It is understood that the development programme, to seek new orebodies, which was announced in 1947,

has had satisfactory results and that the new antimony orebodies are sufficient to ensure a long life at a high rate of production. Exposures of antimony ore in two of the principal sections are reported to be satisfactory. On December 31 the ore reserves, estimated to be payable because of their combined antimony and gold content, amounted to 90,000 tons.

Following the encouraging results of development, steps were taken to increase the capacity of the mill and reduction plant to handle 20,000 tons a month. In the last three months of 1949 there was a restriction of tonnage milled to only 12,800 tons a month, because of shortage of African labour. That difficulty is being overcome. During the quarter ended March 31 of this year, 43,200 tons were milled.

OIL BONDED CORES

Methods of Reducing Fumes

PRACTICAL methods of reducing the emission of fumes from oil bonded cores have been summarised in a technical report recently issued by the Joint Standing Committee on Conditions in Iron Foundries (HMSO, 4d.).

Attention was drawn by the committee to irritating and disagreeable fumes that may be given off when certain types of binders are used in the foundry. The technical report refers to certain methods already suggested for reducing the amount of fume evolved, including the development of core binders which do not give disagreeable gaseous products on decomposition.

The committee recommend these methods for the full consideration of the industry, recognising that development of new binders must be a long-term policy.

The 28 recommendations of the committee are summarised at the end of the technical report, and include the following points:—

General: The number of mixtures used should be reduced to a minimum and the importance of mixing operations should not be underestimated. Extravagant use of binders should be avoided.

Storage of binders: Extremes of temperature and, in the case of powders, dampness, should be avoided.

Sand: Consideration should be given to the grade used and the proportion of clay and other fines kept to a minimum.

Storage of Mixed Sand: Conditions should ensure the lowest possible evaporation of moisture.

Baking: Stoves should be provided with means for recording and controlling temperature.

Casting: All vents should be lighted after casting.

Types of cores: "Shell" cores should replace large solid cores wherever possible.

Core block moulding: The minimum quantity of binder should be used and moulds should be cast under a hood fitted with efficient local exhaust ventilation.

U.S. MAGNESIUM OUTPUT

Further Expansions Predicted

EXPANSION of U.S. production of magnesium by 400 per cent, from 48 million to 240 million lb. a year, required by the continually increasing demand, was predicted recently by Dr. J. D. Hanawalt, general manager, magnesium division of the Dow Chemical Co., at the annual meeting in New York of the Magnesium Association.

The Dow Company is at present sole producer of magnesium in the U.S.A., its plant at Freeport, Texas, having a capacity of 4 million lb. a month. Additional output of 112 million lb. is expected from the re-opening of six other primary plants, which were in use during the war.

Describing the outlook for expanded use of magnesium, Edward S. Christiansen, president of the Magnesium Company of America and president of the Magnesium Association, said that large continuous rolling mill facilities for making magnesium alloy sheet will be available early in 1952 at Madison, Illinois, in a Dow Chemical Company plant. He predicted lower costs when this plant comes into operation.

Greater use of magnesium for non-military products would be dependent to some extent on Government plans for building up reserve stocks. Mr. Christiansen quoted figures to show that consumption of magnesium was increasing more rapidly than any other metal. In process applications wider use of magnesium was made in ductile cast iron and in the manufacture of titanium and zirconium.

Magnesium's use for military purposes was also illustrated by two speakers. Mr. E. Howard Perkins, whose firm is now engaged almost exclusively on the defence programme, said increasing quantities were being used for bombers. Mr. J. P. Donald Garges pointed out that progress made in overcoming problems of ductility, corrosion resistance and fabrication of magnesium had increased its adaptability to exacting aircraft requirements, offering advantages not conferred by aluminium.

STEEL TUBE PRODUCTION

Automatic Machinery Used by U.S. Firm

From OUR NEW YORK CORRESPONDENT

AMONG the machinery recently installed at the National Tube Company's new works at McKeesport, Pennsylvania, is equipment for the mechanical handling of raw and finished material, special processing plant, and modern industrial presses and other power items.

The plant is scheduled to produce 100,000 tons of electrically-welded steel pipe every year, in sizes ranging from 26 to 36 in. Stock consists of plates from $\frac{1}{4}$ in. to $\frac{1}{2}$ in. thickness, with a carbon content of 0.20 to 0.30 per cent and containing 0.85 to 1.25 per cent manganese.

The major units of the mill are sixteen machines used for converting plates to tubes. Ample use is made of roller conveyors for moving the heavy material from unit to unit. First end-sheared, the plate stock is then side-planed and bevelled, and, after edge-rolling, the plate is formed into a "U" by a heavy press. The stock is then formed into a tube, by another press and is then welded outside and inside.

Following this operation the stock is then expanded in a special hydraulic machine that increases the tube diameter by stretching the steel under water pressures of up to 3000 lb. p.s.i. The tubes are then bevelled and end-faced.

Making Plates into Tubes

Fabricating plates into tubes begins in the west end of the new mill where material is started through the plant from a transfer car of 10 tons capacity. When loaded the transfer car is rolled into line with a conveyor table. Electric magnets mounted on a remote-controlled trolley feed the plates on to the conveyor leading to two conventional down-cut mechanical shears mounted together in line. The sheared plate moves on to a run-out table and is then conveyed by drag chain to the planer feed table. Each of these machines, set back to back, consists of a clamp-down bed and a moving platform, on each of which 11 cutters are mounted. These cutters are off-set for increasingly deeper cuts and bevelling.

The plate is then transferred to a plate edge-forming machine. This consists of three adjustable rolls, which give a slight curve to the plate edges. From here the plate is fed into the " U " press by table rolls and a mechanical pusher. Under pressures of up to 2000 tons the plate is then pressed into a deep "U" form.

The formed " U " plate then proceeds to the "O" press and is mechanically fed into the machine. The "O" press is capable of pressures up to 18,000 tons (three integrated presses of 6000 tons each) and forms the plate into a tube.

Utilising a series of conveyors and skids the tube is then dispatched to one of the outside welding machines. These are submerged twin-arc AC fusion welders

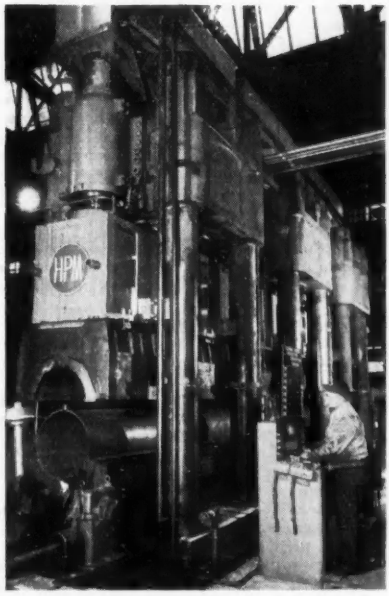

Plate being formed into a tube in the hydraulic machine capable of pressures up to 18,000 tons. Inset (top left): An inspector travelling on a dolly through a 30 in. diameter steel pipe examining a welded seam

equipped with gas preheaters. Flux is fed from an overhead bin and after the weld, the unburned flux is picked up by vacuum and returned to the overhead bin for re-use. A rotating disc shears off the burned flux which is then also removed by suction into a disposal hopper. The tube next moves by conveyor table to the manual squirt welders where, to assure a perfect weld and penetration on both ends of each tube, approximately six inches of the seam are welded. The tubes are then rolled to two idler conveyors from which they are fed to either of two inside welders. Here the tube is placed weld down on a movable carriage. The inside welders, mounted on fixed arms, consist of twin arcs with DC on the lead and AC on the trailing arc. They are preceded by gas pre-heaters.

The pipe is conveyed automatically to a flux remover, where the burned flux is knocked of by an automatic hammer operating on the outside of the tube and removed by suction. From here the pipe is automatically returned by conveyors to one of three tables for its first inspection.

An interesting new piece of equipment at the mill is the hydraulic expander. The tube is lifted into this machine and a tapered ram is inserted in the end of the can. The ends are mechanically belled by pressure insertion of the tapered ram and plug. A rubber gasket seal on the ram insures a water-tight connection. A four-section die, machined to the specified finished OD is placed around the pipe which is then filled with water.

The thickness of the tube walls determines the pressure applied to expand the pipe up to the specified OD. As the pipe enlarges in diameter it is reduced in length and as it reduces in length, the plunger automatically advances to maintain a water-tight seal. Water pressure is then dropped below the yield point of the steel. Two end dies are opened and air hammers are struck against the pipe for testing. If no leaks appear, the other two dies are opened, pressure is again dropped and the entire seam is inspected visually for leaks.

Three centrifugal pumps supply water to the expander from a 25,000-gallon reservoir. Pressure is applied by means of two accumulator systems.

Combating River Pollution

THE second reading of the Rivers (Prevention of Pollution) Bill was moved by Mr. A. Bevan, Minister of Health, in the House of Commons this week. One step forward had already been made, he said, by the establishment of river boards some of which were already established.

Among the points raised by various speakers Mr. A. Colgate said that the effects of sewage pollution were not nearly so serious as those caused by metal solutions.

Mr. G. R. H. Nugent said that it was possible to clear any effluents provided that there were sufficient resources available. The Harwell Atomic Research station had purified atomic effluent, but the plant had cost about £1 million. The new plant at Kingston in full operation would require about 100 million gallons of cooling water a day, and even with a river as large as the Thames, this imposed a very heavy strain on the river flow during the summer. These stations being erected would present serious problems.

The condition of the river Medway at Aylesford was now made abominable by the effluent from the paper mills, said Mr. J. C. Rodgers. Its state has been described in a parody of some famous lines:

I do not chatter any more,
How could my waters chatter?
Crawling along twixt shore and shore
Chock full of morbid matter?
The food the fish are wont to eat
Has now a thorough coating
Of China clay and sugar beet
With surface creosoting.

Dr. R. F. B. Bennett suggested that the Bill should be applied to Southampton Water and its surroundings which was suffering from greasy industrial waste.

A new and formidable element of pollution had arisen, said Mr. G. C. Hutchinson, in the great public monopolies created by the Government. The National Coal Board was to have protection which would not have been afforded to the old collieries and the British Electricity Authority with its new power stations was abstracting water from rivers, and discharging it back again at high temperature.

Mr. A. Blenkinsop, Parliamentary Secretary, Ministry of Health, said that it was the Government's desire gradually to establish practical standards of purity in river effluents, so that eventually the general standard could be raised. Their expectation was that a series of standards would be laid down for the different reaches of rivers, in each instance ensuring a gradual raising rather than lowering of standards.

The Bill was read a second time.

HEATING OF NICKEL ALLOYS

Susceptibility to Attack by Sulphur

SUCCESSFUL hot working of nickel and the high-nickel alloys depends largely upon correct heating. This involves consideration not only of temperature and time required for heating but also of control of the furnace atmosphere.

The most important difference between the heating of nickel and the high-nickel alloys and the heating of materials such as mild steel, chromium-steel or some non-ferrous alloys is the greater susceptibility of the nickel-containing materials to attack by sulphur during heating. Metal surfaces which have been attacked by sulphur at high temperatures have a distinctly burned appearance and if the attack is severe, the material is weakened mechanically and may be rendered useless.

Exposure of the hot metal to sulphurous atmospheres or to other sulphur sources must be avoided. Fuel is the most common source of sulphur, and care has also to be taken in selecting the type of fuel used.

Gas is the most desirable fuel, requiring only a small combustion space and permitting automatic regulation of temperature and of atmosphere within the heating compartment. Town gas, which is low in sulphur is quite satisfactory, the maximum permissible content depending on whether furnace conditions are reducing or oxidising.

Cost of Butane and Propane

Butane and propane are also desirable fuels. While their cost on a B.Th.U. basis is higher than that of oil, the ultimate cost per pound of finished forgings may easily be lower. Both gases are obtainable in cylinders with pressure regulators, a form particularly useful for occasional work in heating Monel, nickel and Inconel for forging, hot-working and riveting.

Solid fuels are unsatisfactory because of the difficulty of obtaining proper heating conditions, inflexibility in heat control and the presence of excessive amounts of sulphur. While it is not impossible to heat the high-nickel materials with the solid fuels such as "blacksmith" coal or coke from coal treated to reduce sulphur, it is very difficult to obtain satisfactory results, and the practice is not recommended.

Other potential sources of sulphur are scale, slag, and cinder on the hearth of the furnace.

To prevent contact with these, the work should be supported above the hearth on rails or supports. The possibility of the furnace brickwork containing sulphur from previous operation on high-sulphur fuels should also not be overlooked.

Sulphur may also be introduced in the form of sulphate salts and sludge remaining on the work from a prior pickling operation or in oil and lubricants used for machining or other fabricating operations. All such contamination should be completely removed before heating. It is also advisable to remove all marking paint, which frequently contains metallic sulphide pigments that can cause embrittlement of the painted areas.

Working Temperatures

Monel, "K" Monel, nickel and Inconel show important differences in their requirements of hot-working temperatures, particularly in the upper safe heating limits and tendencies towards reduced hot ductility.

While the high-nickel materials are being heated, the furnace temperature should be held about 30° C. higher than that at which the work is to be "pulled" and in no case should it be pulled at temperatures below 1100° C. The practice of working the furnaces at excessive temperatures in order to reduce heating time is damaging to nickel and high-nickel alloys.

Though many shops heat nickel and nickel alloys successfully without the aid of pyrometers or automatic temperature control, it is wise to provide these facilities. In their absence, however, preliminary trials should be made on scrap pieces to assist the judging by colour of proper temperatures for hot-working.

* Particulars of hot-working methods (from which the above are abstracted) are given in a handbook on the hot-working, annealing and pickling of Monel nickel and Inconel, published by Henry Wiggin & Co., Ltd., Birmingham.

Burma's Expanding Aluminium Industry

Production of Burmese aluminium fabricating factories is now about 2000 tons annually, compared with 538 tons before the war. Mr. U. Ba Thwin, vice-president of the Burma Aluminium Workers' Union, proposes that industry should receive further Government grants and is pressing for control of imports and removal of general sales tax.

Continuous Casting of Steel

Even Larger Mouldings to be Developed

CONTINUOUS casting of steel has progressed to the point where it is now possible to cast oval sections of 25 to 40 sq. in., Mr. Isaac Harter, chairman of the board of the Babcock and Wilcox Tube company, has reported to the American Academy of Arts and Sciences, Boston, Massachusetts. He also reported that within a year a new mould would be tested which will make it possible to produce a casting with a cross section of 100 sq. in., suitable for rolling into 25-in. strip in a continuous sheet rolling mill.

Mr. Harter considered that the new steelmaking process could ultimately be applied to about 15 per cent of America's output and that improvements now being perfected would increase its application to between 25 and 30 per cent of steel production.

The feasibility of continuous casting of steel was proved two years ago by the Babcock and Wilcox Tube Company and the Republic Steel Corporation; successful large-scale experimental continuous casting has been an objective of the steel industry for more than 100 years.

In continuous casting, steel is poured from the furnace into a ladle and then into a long tube-like vertical mould. The steel solidifies in billet form as it passes downward through the mould and is cut to desired lengths as it emerges. The process eliminates the stripping cranes, soaking pits, and blooming mill operations. Although still not in the commercial stage, the successful application of the principle of continuous casting to steel making, metallurgists agree, would be an outstanding achievement in steel technology.

Analysing the New England situation, Mr. Harter pointed out that the first decision would be whether a new steel mill should be fully integrated—that is, start with coal, iron ore and other basic materials—or start with the melting of scrap steel obtained locally. "This is a basic question," he said, "because, even though an economical supply of metallurgical coke may be available, cheap iron ore will not be available for two or three years. The investment required for an integrated steel mill of the same annual capacity would be two to three times that of the non-integrated mill."

He said that the newly developed mould for producing castings with a cross section of 100 sq. in., which will be tested during the coming year, will be constructed so that it can be enlarged.

New Steel Alloy Developed in U.S.

LARGE claims for technical and economic advantages are made in the U.S.A. for a new alloy steel, Carilloy TI, which the Carnegie-Illinois Steel Corporation has produced after four years' laboratory work. Its special characteristics are said to be exceptional strength for industrial or war uses, resistance to atmospheric corrosion approximately three times as great as that of ordinary carbon steels and retention of its mechanical attributes at sub-zero temperatures.

The company claims that Carilloy TI will effect savings in mobile equipment since it can be made in quantity in standard open hearth furnaces. It may be welded easily with electrodes now available, yet it possesses almost triple the strength of ordinary welding-grade structural steels.

In producing the new steel special attention was given to the conservation of costly and strategic alloying materials. Its strength is derived from the inclusion of small quantities of a comparatively large number of alloying elements which are readily available. No special equipment or procedures are necessary for its fabrication and welding does not adversely affect its properties While the new steel is basically a plate steel, it may be produced in other forms.

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Technical Publications

ROTARY dryers with stainless steel shell and internal lifters specially designed for handling corrosive chemical materials and crystals are strikingly illustrated and described among the wide range of plant and machinery in "Typical Installations," latest publication of Ernest Newell & Co., Ltd., Misterton, Notts. Other products include calcining and handling plant for chemical work and fertiliser factories, coke oven plants, and slurry pumps. The volume which is well-printed and designed has also been published in Spanish and French.

* * *

AROMATIC solvents for insecticides and herbicides are described in technical service leaflet Number 1 now available from Petrochemicals, Ltd., London. DDT and BHC.90, and herbicides such as pentachlorophenol are readily soluble in aromatic solvents 23-5, 25-7 and 23-9. They are non-toxic and have high flash points.

* * *

COLOUR is inextricably associated with industry in countless ways. Knowledge of colour is based largely on the sciences of physics, chemistry and psychology. The current issue of "CIL Oval" (Vol. 19, No. 5) magazine of Canadian Industries, Ltd., is devoted entirely to this subject. In "Chemistry Accepts a Challenge", Dr. C. Y. Hopkins, head of the protective coatings section, Division of Applied Chemistry, National Research Council, Ottawa, shows how chemistry has identified various colour substances and forecast the development of new colours for future use.

* * *

ADVANTAGES of zinc chromate paints when used as primers on light metals and iron and steel are outlined in a new section of the revised and enlarged edition of "The Use of Zinc Pigments in Exterior Paints." It is issued by the Zinc Pigment Development Association and brings up to date the original test of 1947, demonstrating the versatility of the zinc formulations.

* * *

THE new edition of the "FBI Register of British Manufacturers" for 1950/51 is now available. The volume of more than 1000 pages, has a classified buyer's guide listing in alphabetical order 5000 products and services. There are a classified list of trade associations affiliated with the FBI and an alphabetical guide of brand and trade names. Each of the seven sections has an introduction in French and Spanish as well as English. The register (42s.) is published jointly by Kelly's Directories and by Iliffe & Sons, Ltd.

* * *

THE current issue of "The Nickel Bulletin" (Vol. 23, Nos. 8-9), published by the Mond Nickel Co., Ltd., London, is entirely devoted to abstracts from recently published information dealing with nickel and nickel alloys. Most of these refer to heat and corrosion resisting alloys. Particular attention is drawn to American work on heat-resisting properties of high-nickel and high-chromium steels.

* * *

PRACTICAL facts about Terylene polyester fibre, including its physical properties and resistance to oxidising agents, are given in a preliminary information brochure issued by I.C.I., Ltd. Among the other important properties indicated are high resistance to abrasion, light and weather, insect pests and attack by microorganisms. Terylene does not support combustion and will burn only after prolonged application of heat.

* * *

INFORMATION relating to the safe handling of styrene monomer in its laboratory application, manufacture, transportation and storage are set out in a manual issued by the Manufacturing Chemists' Association, Inc., Washington, D.C. Particular attention is drawn to health, explosion and fire hazards and first aid and medical treatment.

* * *

"STANDARD Methods for Testing Tar and its Productions" (3rd edition, 30s. 9d. post paid) has been published by the Standardisation of Tar Products Tests Committee, London, and is expected to be available towards the end of this month. The 1938 edition has been thoroughly revised and the new work includes several tentative methods and a new section covering coal tar fuels.

* * *

DETERGENTS, soaps, water softeners, polishes and their manufacturers classified under headings London and country are given in "The Soap Makers' Directory, 1950" (3s. 6d., post paid 3s. 10d.) now obtainable from Simpkin Marshall (1941), Ltd. This edition which is of value to manufacturers of plant and machinery, also contains a list of candle makers in Great Britain.

OVERSEAS CHEMISTRY AND INDUSTRY

INDIAN MINERAL DEVELOPMENTS

Bauxite, Beryllium and Gypsum

GEOLOGICAL officials of the Government of India have estimated the bauxite deposits at Tungar Hill, in the Thana district of Bombay State, at about 100,000 tons, and further detailed examination has been recommended. These deposits are not likely to be exploited for the manufacture of aluminium in view of the existence of extensive reserves in the Belgaum and Kolhapur districts, which could be utilised in the near future. It is thought probable, however, that they may be used in the purification of Kerosene and in the manufacture of abrasives and refractories. Extensive resources of high-grade bauxite suitable for the manufacture of aluminium are also reported to exist in the hills about 15 to 20 miles north of the Korba coalfield, near Bilaspur. Preliminary surveys have been completed but the total quantity of bauxite available in this area has not yet been estimated.

Aluminium Prices

Manufacturers of aluminium goods in Bombay have told the Indian Tariff Board that, provided the Government brought about a decrease in the price of aluminium metal, they would be agreeable to governmental control over marketing prices of the finished articles or to co-operating in a thorough examination of the problem. Manufacturers said they did not agree that the protective duty had not adversely affected the demand for aluminium products. The comparatively higher cost of Indian aluminium goods as against those of British and other foreign manufacture in the overseas markets, it was stated, portended a danger that India might lose her market in South East Asia, the Middle East and Ceylon.

Fundamental research in felspar crystals is being carried out by Professor Raman, one of India's leading scientists, in his laboratory at Bangalore. Investigation is being made into the manner in which crystals irradiate in the process of separation of the different felspar components. The professor also proposes to carry out research in sugar technology. Support is already assured from the sugar manufacturers.

Occurrences of high-grade bauxite suitable for aluminium manufacture are reported some 20 miles north of the Korba coalfield, near Bilaspur, in the state of Madhya Pradesh. The Geographical Survey of India is also carrying out investigation of flux grade limestone at Mohtara, Jairanagar and Bilaspur, and samples are being analysed. White clays have been found in the Saoner, Nagpur and Anravati areas while magnet surveys are being carried out on the manganese ore deposits in the Balaghat district.

The wealth of minerals at Rajasthan was emphasised by Mr. N. V. Gadgil, Minister of Works, Mines and Power, Government of India, when he recently opened an exhibition at Jaipur. Exhibits included beryllium, calcite, coal, emeralds, gypsum, limestone, pink and white marble, and semi-precious stones.

U.S. Polystyrene Shortage

EXTREME shortage of polystyrene plastic raw material is reported to be having disastrous results for some plastic moulders in the U.S.A., according to the Society of the Plastics Industry, Inc., New York. Approximately 300 plastic injection moulders may be forced out of business. There are at present 900 plastic injection moulders in the United States.

Because of the great demand for polystyrene plastic products there has been a large expansion in the manufacturing facilities. Additional press capacity requires twice as much moulding powder and plants are still installing additional and larger equipment.

Allocations of the raw materials are based on last year's requirements, and some new injection plants are thus receiving no moulding powder.

Suppliers of the raw material were keeping abreast of demand until the all-out production of synthetic rubber created abnormal demand for styrene.

During the summer, plastic raw material manufacturers, operating at practically full capacity, produced 75.18 million lb. per month of all kinds of plastic moulding powders of which 23.13 million lb. was polystyrene. That is now being cut to 17 million lb. for moulding purposes, comparing with an anticipated requirement of 30 million lb. per month, when all the new moulding equipment now being installed is in operation.

DUTCH PRODUCTION

Progress in Antibiotics

FURTHER progress is reported in the Dutch antibiotic field. The Royal Yeast & Distillery Co., of Delft, which is a producer of penicillin, has started commercial production of chlorine-amphenicol, a drug of American origin effective against a number of diseases which penicillin does not control. The sales campaign for Dutch penicillin in other countries is to be pushed forward through another chemical firm, Organon, Ltd., of Oss, the foreign affiliates of which will act as agents for the product.

The Brocachemie, Ltd. (an associate of Brocades Stheeman & Pharmacia) has enlarged production of pora-amino-salicylic acid, the intention being shortly to supply most of the Dutch need of PAS, calculated to be some 9000 kg. a year.

Great headway has also been noted in the Dutch production of rock salt. Output of salt in 1939 amounted to about 200,000 tons and to 330,000 tons in 1949. The figures of the current year so far justify the expectation that around 400,000 tons (or double that of pre-war) should be obtained for 1950 by the Royal Dutch Salt Industry, Ltd. Production of salt-derived chemicals, which has been still further stimulated by the international implications of the stoppage in a large section of the American alkali industry in recent months, has also reached a record at Hengelo.

The record Dutch consumption of 145,000 tons of pure nitrogen during the last agricultural season, which again suggested the need for a large replenishment by import, is expected now to be replaced mainly by the greatly increased home production of the State mines.

Italian Coal Project

COAL imports to Italy are likely to be reduced from 800,000 to 650,000 tons a month if a Government scheme to increase the use of Sardinian coal is adopted. Considerable reserves are available at Sulcis where mining was expanded under the Fascist regime, but owing to its low grade and high cost there is little demand for Sardinian coal.

Modernisation of the mines is, however, being considered by the Ministry of Industry and Trade to increase output. Part of this increase would be used in a chemical fertiliser plant, the construction of which is being studied by a commission.

GERMAN STANDARDS GROUP

Measurement and Control Methods

THE growing importance of standards to chemical industry has recently been emphasised in many ways in Germany, particularly by exhibitions and other activities of the scientific instrument manufacturers. Further evidence of the increasing interest is supplied by the recent establishment in Germany of a Normenarbeitsgemeinschaft fur Mess—und Regeltechnik (NAMUR) in the chemical industry—a standards association for measuring and control methods. An account of its objects and policy is given by Dr. B. Sturn, of Leverkusen, in *Chemische Ind.* (1950, *2*, (11) 546-548).

This new standards institute has been established largely through the initiative of the Farbenjab Bayer, at Leverkusen. It does not intend to encroach upon or overlap the functions of the well-established standards institution DNI (Deutsche Norms. Inst.). Its purpose is rather to act in an advisory, consultative and critical capacity. More particularly it will try to interest chemical manufacturers in its work and to stimulate further adoption of standards and more accurate controls.

New Instruments

As its secondary objective NAMUR will again play a critical rôle in respect of new instruments and apparatus and improvements in existing types. Apparently this will include actual tests and inspection, for it is hoped to save the makers much expense in labour and research in marketing their new instruments. The aid of specialists may be invoked and lectures and discussions arranged. It is also hoped that supplementary questions, both physical and organisational, may be dealt with.

The work of the new association will be carried out through technical committees and sub-committees, classified according to the main divisions of physico-chemical factors concerned. The departments are described in some detail under 16 headings: temperature, fluid flow, pressure, *p*H moisture, and other determinations, gas analysis, general control technique, optical measurements, oscillation, explosion risks, viewing, sighting and dialling; recording drums; symbols, units, and formulae; rheological measurements (stresses, strains, deformations, etc.). Some of these are discussed in connection with already existing standards, and further improvements or changes are indicated.

The Chemist's Bookshelf

THE TRANSURANIUM ELEMENTS. Research Papers. Edited by G. T. Seaborg, J. J. Katz and W. M. Manning. 1949, New York: McGraw-Hill Book Co., Inc. London: McGraw-Hill Publishing Co., Ltd. 2 Vols. Pp. xxxvi + 860; xii + 873. 127s. 6d.

These two books are part of the National Nuclear Energy Series of about 60 volumes (4-14B). They appear as the result of work done under the Manhattan Project and the Atomic Energy Commission and contain over 150 original research papers dealing with the post-uranium elements and related topics.

In order to publish this material without undue delay the editing of individual papers has been very limited. As a result there are occasional discrepancies. Some are due to disagreement between individual determinations, while others arise from the early reporting of values which have subsequently been superseded by more precise figures. The entire series of papers has, in fact, been treated as a group of contributions to a journal of chemical or physical research.

These present volumes are largely concerned with the chemistry and physics of the synthetic elements neptunium (93), plutonium (94), americium (95) and curium (96). Plutonium receives most attention because of the great amount of work carried out on this element. In addition, a few papers about some of the natural heavy radioactive elements are included for reference convenience.

It might at first appear that this work would have a very limited appeal, but a short study of the contents shows that this is not so. Most of the papers will prove of interest and importance to any chemist dealing with research in pure inorganic chemistry and particularly to workers concerned with inorganic syntheses. Much of the material will be found to have a bearing on wider fields of work than those suggested by the title.

Of extreme interest is the clear indication of the importance of small-scale techniques in synthetic inorganic chemistry. A high proportion of the papers show that the work involved preparative operations on every scale, from centigram to microgram. Particularly fascinating are the accounts of the isolation and handling of microgram amounts of plutonium and neptunium when these elements were first investigated. The flowsheet in Paper 1.8, for example, starts from 90 kg. of irradiated uranyl nitrate as raw material, and gradually finds its way, after eight pages, to Fraction 45, 20 micrograms of plutonium hydroxide, and Fraction 46, 30 microlitres of a solution containing about 0.5 microgram of plutonium. The final comment on Fraction 46, "Retained for plutonium recovery," is sufficient indication of the immense skill involved in devising and handling the intricate techniques.

This aspect, however, is only one of many. A random selection of titles shows how wide and varied are the interests served. Among the most revealing are: Search for Elements 94 and 93 in Nature: The Chemical Properties of Elements 94 and 93; The Plutonium (iii)/(iv) Couple—Potential Measurements; The Tripositive Oxidation State of Plutonium; Complex Ions of Plutonium—Transference Measurements; Acid-Base Titrations of Plutonium (vi); Solubilities of Plutonium Trichloracetate in Various Reagents; The Vapour Pressure of Plutonium Halides; Composition of Plutonium (iv) 8-Hydroxyquinolate; Kinetics and Mechanisms of Aqueous Oxidation-Reduction Reactions of Neptunium; The Tracer Chemistry of Americium and Curium in Aqueous Solutions; Separation of Actinium from Rare Earths Using Ion-Exchange Resins; The Crystal Structure of NpO_2 and NpO; Electronic Structure of the Heaviest Elements and The Neptunium (4n+1) Radioactive Family.

Although these books are large they should wear well. The photolithographic method of printing is clear, and makes for easy reading. In particular, the numerous illustrations are pleasing and commendably clear.—C.L.W.

Book Received

THE EFFECTS OF ATOMIC WEAPONS. Dr. S. Glasstone and others. Revised 1950: U.S. Atomic Energy Commission. Pp. x + 456. $1.25.

· OVERSEAS ·

Rubber Road Test in Ceylon

The first rubberised roadway in Ceylon has been laid from the main highway to the new laboratory of the Rubber Technologists in Katukuranda. The surface is constructed with varying quantities of rubber latex mixed with bitumen, and wear will be tested on different sections.

Particle Accelerator for Mexico

The High Voltage Engineering Corporation, Cambridge, Massachusetts, has been authorised to export a 2 million-volt Van de Graaff positive ion electrostatic accelerator to the National Autonomous University of Mexico in Mexico City. The U.S. Atomic Energy Commission states that the equipment does not contain any components of a secret nature.

International Textile Exhibition

Great Britain will show textile machinery and chemicals for dyeing at the International Textile Exhibition to be held in Lille from April 28 to May 20 next year. The wool centres of the British Commonwealth will be represented by the International Wool Secretariat. Firms from Belgium, Canada, Italy, Japan, Pakistan, Spain, Sweden, Switzerland and the United States will also be participating.

Rising Production in Western Germany

The mounting production of certain important chemicals in Western Germany is reflected by statistics for last August issued by the Office of International Trade, U.S. Department of Commerce. These showed (in metric tons, July figures in parentheses): Sulphuric acid, 100,479 (96,034); caustic soda, 29,603 (29,507); soda ash, 68.000 (62,000); calcium carbide, 59,333 (58,140); nitrogenous fertiliser, N content, 38,000 (37,700); and phosphatic fertiliser 27,000 (26,700).

New Aluminium Phosphates Bonding Agents

Aluminium phosphates bonding agents for refractories, high temperature cements and refractory paints are being produced in commercial quantities by the Monsanto Chemical Company, St. Louis, U.S.A. The products, ranging in ratio of aluminium to phosphoric acid from 1.0 to 1.67, and in physical form from dry solids to water solutions of high concentrations, have been given the trade name Alkophos. They are said to provide good green strength, making it possible to fire moulded shapes in place to yield high temperature non-slagging refractories.

Elemental Plutonium Found in Belgian Congo

The U.S. Atomic Energy Commission has announced the discovery of elemental plutonium in pitch-blende from the Belgian Congo.

Scientific Collaboration in Africa

The first session of the Scientific Council for Africa ended in Nairobi on November 26. One of the proposals considered worthy of further examination was the co-ordination of scientific, library and bibliography services.

Palestine Potash Agreement

The Government of Israel has contracted to lend the Palestine Potash Company $2.5 million, which, together with $5 million to be raised by the company, will be used for the replacement of plant and the building of a road from the southern end of the Dead Sea to Beersheba.

Aluminium Shortage

A deficit of 16,000 tons in aluminium supplies this year is estimated by ECA. Production is expected to reach 1.275 million tons, including 640,000 from the U.S.A., 380.000 from Canada, 225,000 from Europe and 30,000 from other countries. World consumption (excluding Russia and satellite countries) is estimated at 1.291 million tons which includes 820,000 by the U.S.A., 55,000 by Canada, 380,000 by Europe and 36,000 by other countries.

Pakistani Scientific Education

The six-year development plan of the Government of Pakistan, which is estimated to cost Rs.2600 million, includes a projected expenditure of Rs.92 million on the subsidisation of fertilisers and manures. The plan also provides for Rs.50 million on account of the training overseas of Pakistani scholars in technical and scientific subjects, and Rs.40 million for the setting up of polytechnics, laboratories, etc.

Australian Plastics Expansion

The Beetle-Elliott company, of Sydney, has acquired Australian patent rights for melamine resins and moulding powders, in which much interest has been shown by the Australian plastics industry. The resins are being made at the company's plant at Rozelle, N.S.W. The company's general manager, Mr. Bonnett, is visiting European countries to study the most up-to-date methods of manufacturing the powder form in Australia and the company intends to expand its plant for this purpose.

OBITUARY

A LEADER OF INDUSTRY

Tribute to Sir Frederick Bain

CHEMISTRY and industry lost a great leader in the passing of SIR FREDERICK BAIN, M.C., deputy chairman of Imperial Chemical Industries, Ltd., who died in a London hospital last week.

Sir Frederick, who was 61, had been taken ill at a farewell dinner to the American ambassador Mr. Lewis Douglas.

Born in Macduff, Banffshire, he had his early education at Banff Academy. It was hoped to send him to a university, but any chance of this was lost by the death of his father when Frederick Bain was only 17 years of age. Young Bain went into a fertiliser business in Aberdeen, where he so impressed his employer that he was allowed to attend afternoon lectures at the University.

During the 1914-18 war he served with the Gordon Highlanders and was twice wounded, resulting in the loss of an arm. He was twice mentioned in dispatches and awarded the M.C. When only 27 his abilities were transferred to another sphere and he became, in 1916, Deputy Director of Chemical Warfare Supply at the Ministry of Munitions.

War-time Appointments

After the war he joined the United Alkali Company, one of the four concerns which in 1926 merged to form Imperial Chemical Industries. When war again broke out, in 1941 he was appointed chairman of the Chemical Control Board at the Ministry of Supply and a year later he became chairman of the Chemical Planning Committee at the Ministry of Production.

Sir Frederick was a statesman among industrialists always with an outlook wider than his own firm. He was on the best of terms with politicians of all parties, with eminent scientists and university teachers. It was he who, as president of the Federation of British Industries, persuaded Sir Stafford Cripps to let him try to obtain a voluntary agreement from industry when the chancellor wanted to limit dividends by law.

Whatever he undertook he threw himself into it wholeheartedly. To the last he took a keen interest in the Anglo-American Council on Productivity, which he had helped to set up. He was keenly interested in any scheme from staff welfare to research projects.

Sir Frederick Bain

Many public tributes have been paid to this man of abounding spirit, who besides being a chemist and an able administrator, was a master of literature, with a love of Burns, Milton and Shakespeare and a wide appreciation of contemporary writers.

Lord McGowan, chairman of I.C.I., wrote in *The Times*:—

The passing of Sir Frederick Bain, after a very short illness, leaves a blank in the lives of his innumerable friends that will not be filled. He was the possessor of a rare brand of personal magnetism that attracted people to him in every walk of life, and they were never disappointed.

He was infinitely kind and generous, had a great zest for life, loved its beautiful things—its books, and plays, and poetry—and lived with all the dash and elan of the Gordon Highlander that he was. He rapidly overcame the physical disability caused by the loss of his arm in the first World War. It did not affect his spirit—he was always unquenchably cheerful.

He was a prodigious worker, not only for our company but on Government committees, where his experience was of the greatest value. His enthusiasm had the quality of wildfire, and could be relied upon to engulf all those with whom he came into contact. He was a tower of strength in our organisation, and in his passing we suffer a grievous loss.

Sir Frederick had travelled a great deal, and his wonderful faculty for making friends in foreign lands served to cement invaluable trade relationships, not only for I.C.I. but for the British nation. He will be much mourned as a personal friend not only within our own organisation but by countless people not directly associated with it.

HOME

Agar-Agar from Japan in 1951

The Ministry of Food has announced that a limited quantity of agar-agar may be imported from Japan under individual licence, up to June 1951.

Lord Leverhulme Memorial Window

A memorial window to the late Lord Leverhulme was unveiled by Sir Geoffrey Heyworth, chairman of Lever Bros., and Unilever, during a special service at Christ Church, Port Sunlight, on November 26. The window was voluntarily paid for by Port Sunlight workers.

Possible Shortage of Nitrogen

It is estimated that consumption of nitrogen will exceed production by 35,000 tons in the year ending June 30, 1951. In its annual report on the nitrogen industry Aikman (London) estimates that stocks at June 30 next are likely to be not more than 285,000 tons, equivalent to 28 days supply.

Fatal Explosion Unexplained

The cause of the explosion in one of the mixing huts of Explosives and Chemical Products, Ltd., at Bramble Island, near Harwich, on November 6 in which four men lost their lives remains unknown. At the resumed inquest at Harwich last week the Home Office inspector, Major W. Crawford, said there was no evidence of any kind to show what was the cause and he did not think anyone would be able to throw any light on it. A verdict of "Accidental death" was returned.

Donations to Leeds University

Donations and grants acknowledged by the council of the University of Leeds last week, were: £250 from I.C.I., Ltd., to the department of biomolecular structure; £225 from the United Steel Companies, Ltd., Sheffiield, and £225 from Stewarts and Lloyds, Ltd., Corby, to the department of physics; £500 a year for two years from Albright and Wilson, Ltd., Birmingham, for the encouragement of analytical chemistry, to the department of inorganic and physical chemistry; £250 and equipment from I.C.I., Ltd., and £50 from the Society of Dyers and Colourists for the purchase of apparatus for the department of colour chemistry and dyeing; and £510 from the Agricultural Research Council for research to the department of agriculture.

New Chemical Factory

Sentinel Products, Ltd., of 12 St. Andrew's Grove, London, N.16, is planning a new factory at Southend, Essex.

KID Exemptions for December

The following chemicals have been exempted from Key Industry Duty for the period December 1-31, 1950: 2-(*p*-acetamidobenzene-sulphonamido)-pyrimidine; benzene hexachloride; phenylmercury acetate.

Coal Production

There was a slight drop in deep-mined coal production last week and a more substantial fall in opencast output. Comparative figures are: Last week: 4,350,100 tons (deep-mined 4,212,500 tons, opencast 137,600 tons). Previous week: 4, 4,435,700 tons (deep-mined 4,214,100 tons, opencast 221,600 tons).

Cosmic Ray Research in the Stratosphere

The Bristol University research team, under the direction of Professor C. F. Powell, is to use large balloons to investigate high-energy particles in the stratosphere. The balloons, some of which will be 200 ft. in diameter, will carry special photographic plates to a height of 22 miles so as to record the tracks of atomic particles during their passage through matter.

Spasmodic Tin Prices

After a slight rise on November 21 cash was dealt in at £1125 in the closing session, with three months sold at £1060 and mid-February at £1065. The market was uncertain and quiet on following days and prices fell again on November 27. In the afternoon there was a turnover of 45 tons, cash being sold at £1000 and three months quotations hardening slightly to £925. A sharp rally on November 28 raised the cash price to £1117 10s., with three months £985-£995.

Unlicensed Explosives

For offences against the industrial explosives regulations, Arnott, Young and Co., Ltd., Fullarton Iron Works, Carmyle, were fined £10 at the Airdrie Sheriff Court last week, and one of their workmen, Fred Parven, was fined £5. The firm was admitted to have a licence for only 10 lb. of explosive and to have kept in an office 68¾ lb., although it was fully ten years since it had used explosives.

Next Week's Events

MONDAY, DECEMBER 4

O.C.C.A.

Hull: Royal Station Hotel, 7 p.m. F. C. Stephen: "Insulating Varnishes."

Incorporated Plant Engineers

London: John Adam Street, Adelphi, W.C.2. 7 p.m. W. K. B. Marshall: "Arc Welding."

Society of Chemical Industry

London: London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1. 6.30 p.m. A. R. Powell: "Germanium and Gallium."

TUESDAY, DECEMBER 5

Society of Instrument Technology

Manchester: College of Technology, 7.30 p.m. J. R. Boundy and S. G. Bergen: "An Electronic Process Controller."

Institution of Chemical Engineers

London: Burlington House, Piccadilly, W.1. 5.30 p.m. J. M. Coulson and J. H. Ellinger: "A Nomograph for the Calculation of Heat Transfer Coefficients for Convection without Change of Phase." H. R. C. Pratt: "The Application of Turbulent Flow Theory to Transfer Processes in Tubes Containing Turbulence Promoters and Packings."

WEDNESDAY, DECEMBER 6

Royal Institute of Chemistry

Widnes: Municipal Technical College, 7 p.m. "Radiation and Light Sources for the Chemist."

Institute of Petroleum

London: 26 Portland Place, W.1, 5.30 p.m. "Spectroscopic Methods in Hydrocarbon Research." Papers by J. G. Reynolds, Dr. N. Sheppard and Dr. W. C. Price.

Society of Chemical Industry

London: Burlington House, Piccadilly, W.1. (Food Group with the Society of Public Analysts and Other Analytical Chemists). H. C. S. de Whalley, N. Albon and D. Gross: "Applications of Paper Chromatographic Methods in the Sugar Industry."

Physical Society (Low Temperature Group)

London: Science Museum, S.W.7, 5.30 p.m. (Members of the Institution of Chemical Engineers invited). R. Waugh: "Reciprocating Expansion Engines"; E. and P. E. F. Crewdson: "Development of Air Expansion Turbines"; G. G. Haselden, M. W. Reis and N. P. W. Moore: "A New Rotary Expansion Engine."

THURSDAY, DECEMBER 7

Royal Institute of Chemistry

Bristol: The University, Woodland Road, 7 p.m. (Bristol and District Section, with CS, SCI and CEG) A. W. Morrison: "Carbon as a Material of Construction."

Durham: University Chemical Laboratories, South Road, 7.45 p.m. (With SCI) Professor C. A. Coulson: "What is a Chemical Bond?"

Falkirk: Lea Park Rooms, 7.30 p.m. R. E. Willmott: "Manufacture of Yeast."

Chemical Engineering Group (SCI)

Bristol: University, Woodland Road, 6.30 p.m. A. W. Morrison: "Carbon as a Material of Construction."

FRIDAY, DECEMBER 8

The Chemical Society

Hull: University College, 6 p.m. (With RIC) Professor John Read: "Chemical Personalities a Century Ago."

Birmingham: The University, Edgbaston, 4.30 p.m. Professor D. H. Hey: "Homolytic Aromatic Substitution."

Newcastle: Bedson Club Lecture, Chemistry Department, Kings College, 5 p.m. Professor H. J. Emeléus: "The Application of Halogen Fluorides in Preparative Inorganic Chemistry."

Royal Institute of Chemistry

Dundee: Royal British Hotel, 7 p.m. Messrs. Watson, Merry and Wylie: "Bituminous Products, Production and Control."

Glasgow: Royal Technical College, George Street, C.1, 7.15 p.m. Sir Wallace Akers: "Problems in the Production of Useful Power from Atomic Energy."

Society of Chemical Industry

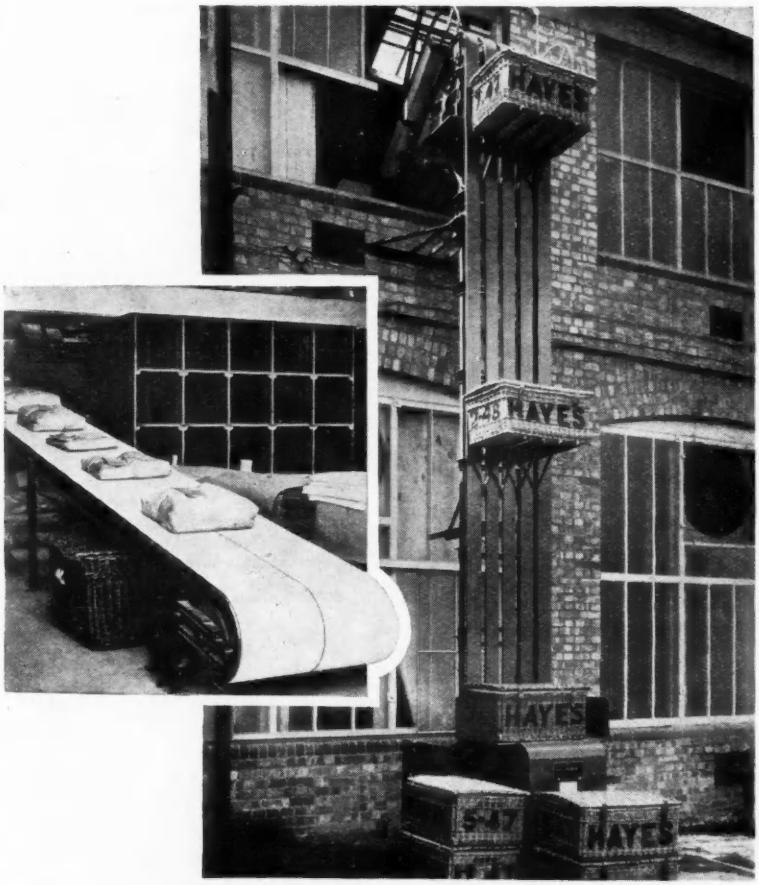
London: Chemistry Lecture Theatre, Kings College, Strand, W.C.2, 7 p.m. Dr. W. J. Arrol: "The Preparation of Radio-Active Materials in the High Degree of Purity."

Bradford Chemical Society

Bradford: Technical College, 7 p.m. Dr. G. F. Wood: "Some Interesting Flow Phenomena."

O.C.C.A.

Manchester: The Engineers' Club, Albert Square, 2 p.m. Dr. R. R. Goodall: "Partition Chromatography."



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The Stock and Chemical Markets

NEWS from Korea, and Mr. Gaitskell's warning of still higher taxation to come, made stock markets less active this week, although industrial shares held all but a small part of recent gains. British Funds were inclined to firm up awaiting the decision as to whether there is to be a conversion offer in respect of National War Bonds (1951-53).

There are more indications that 1951 will be a very difficult year for industry because of rising prices and the probability that many essential materials will be rationed because of the priority requirements of rearmament and export trade. Many companies are in need of additional capital to meet the mounting cost of stocks. In many cases the uncertain outlook makes it impossible to issue ordinary shares. The market thus expects that the new money will have to be raised by means of preference shares and other prior charges ranking in front of ordinary shareholders. Nevertheless, many industrial shares are attractive at current prices and that despite future uncertainty most leading industrial companies have reasonable prospects of maintaining dividends at last year's rates. Many of last year's dividends were much below actual earnings on the shares; and there would have to be an exceptionally heavy fall in profits to lower the dividends next year.

Chemical and kindred shares have not held recent best levels, but movements generally were not more than a few pence. After changing hands at 43s. 3d., Imperial Chemical eased to 43s., while Fisons, at 25s. 6d., receded a little further. Monsanto, at 51s., were steady. Albright & Wilson (at 30s. 9d.) were held tightly because of the projected bonus, the terms of which were announced when the preference shares issue was made. Boake Roberts 5s. shares were 34s. 9d., Brotherton, 21s. 3d., and F. W. Berk 2s. 6d. shares, 12s. 9d. Laporte Chemicals 5s. units were 10s. 3d., Lawes Chemical, 11s., and Major & Co., 3s. 3d. Amber Chemical 2s. shares were 2s. 9d., Bowman Chemical, 6s. and Pest Control, 7s. 4½d. W. J. Bush were 77s. 6d. "ex" the bonus shares. Calor Gas shares firmed up to 21s. 3d. following publication of the full report and accounts.

Despite higher dividend hopes, Turner & Newall eased to 86s. but United Molasses have been active around 48s. and the 4s. units of the Distillers Co. were well maintained at 19s. 6d. Associated Cement, however, came back to 79s. 9d., and Dunlop Rubber to 55s. 1½d.

There was again good demand for colliery and coke-oven shares on latest market estimates of break-up values. British Benzol rose further to 88s. 9d. and Powell Duffryn were 32s. 3d. Allied Ironfounders, at 50s. 9d., responded to the increased interim dividend. Higher dividend hopes have attracted some attention to Goodlass Wall shares which further strengthened to 39s. 6d. Tube Investments at £6½ were firm on the view that shareholders will have preferential allotment in the forthcoming preference share offer.

Boots Drug, at 49s. 9d., strengthened after an earlier small decline. Glaxo have remained active at slightly over 60s., partly on market talk of higher dividend prospects. Triplex Glass were active at over 28s. and United Glass Bottle showed firmness at 77s. 6d. General Refractories again moved higher, at 24s. 9d.

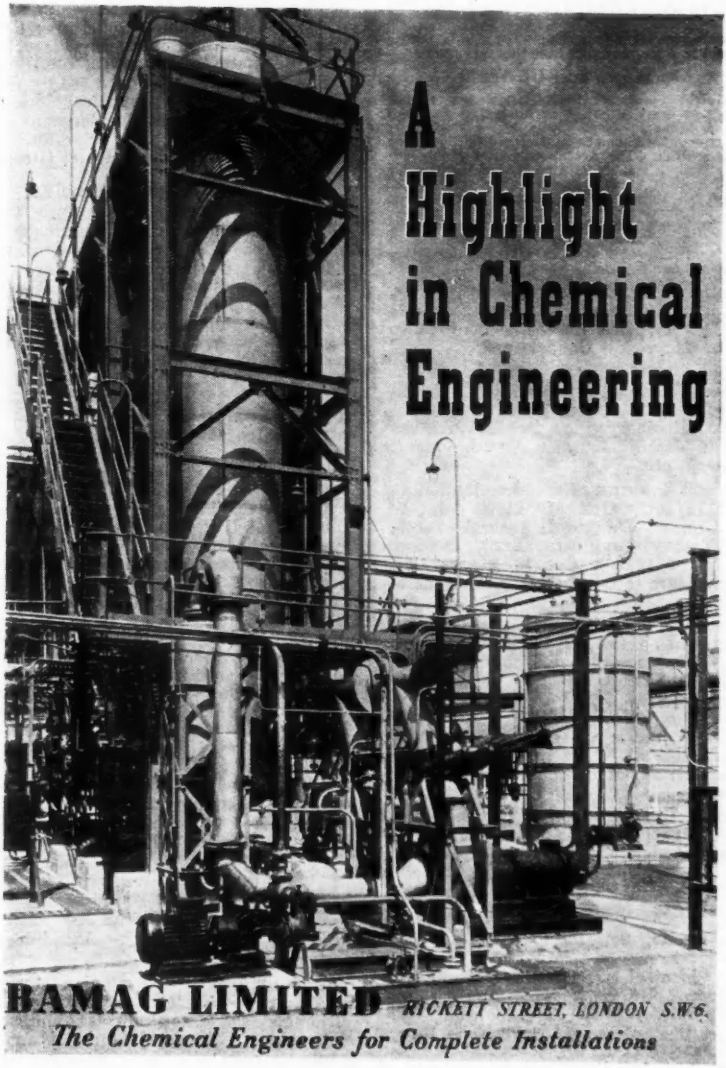
Oils were uncertain, Shell eased after touching 70s. while Anglo-Iranian were dull on fears of fresh Persian opposition to the royalties agreement.

Market Reports

AN active demand, both from home users and for shipment, continues for most items in the industrial chemicals market and there have been no important price alterations during the week. Soda products generally remain in good call and all available supplies of potash chemicals are quickly absorbed. A steady trade is reported in formaldehyde, bleaching powder and hydrogen peroxide. White and red lead are in good request at unchanged rates. Business in coal tar products continues brisk, with buying interest in most items fully sustained.

MANCHESTER.—A steady demand for heavy chemical products continued on the Manchester market during the past week. Almost a full range of alkalis are being taken up by home users in substantial quantities. There have been fresh inquiries for alkalis from exporters. Ammonia, potash and magnesia compounds, as well as many miscellaneous chemicals are also in demand. Moderate new business has been placed in fertilisers. There has been activity in most tar products and a further stiffening of prices of American

(*continued at foot of page* 796)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Law and Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

ABARDALE MANUFACTURING CO., LTD., Brighton, manufacturers of waxes, etc. (M., 2/12/50). Oct. 19, £300 debenture, to W. V. Meyrick, Sanderstead; general charge.

ARISTON ALLOYS, LTD., Croydon. (M., 2/12/50). Nov. 1, mortgage, to Martins Bank, Ltd.; charged on factory premises at Mill Lane, Croydon, with plant, machinery, etc.

GLENDON PLASTICS, LTD., London, W.C. (M., 2/12/50). Oct. 31, £1000 deb., to C. C. Stewart, Chingford; general charge.

LEA VALLEY CHEMICALS, LTD., London, E.C. (M., 2/12/50). Oct. 18, £15,000 (not ex.) debenture to Courtaulds, Ltd.; general charge.

MEDICO BIOLOGICAL LABORATORIES, LTD., London, S.E. (M., 2/12/50). Oct. 27, £6500 debentures; general charge. *Nil. Feb. 10, 1947.

Satisfactions

DAVIS & DAVIS (MALDEN), LTD., New Malden, chemists. (M.S., 2/12/50). Satisfaction Oct. 24, of charge registered Dec. 21, 1945.

WELTON LABORATORIES, LTD., Bradford. (M.S., 2/12/50). Satisfaction Oct. 26, of mortgage registered Jan. 1, 1948.

New Registrations

Dabitoff Co. (London), Ltd.

Private company. (488,158.) Capital £1000. Chemical manufacturers, druggists, drysalters, oil and colour men, etc. Subscribers: W. B. T. Johnson, W. Ivimey. Reg. office: 12 Devonshire Row, Bishopsgate, E.C.2.

Denton & Jutsum (Sales), Ltd.

Private company. (488,621). Capital £100. Manufacturers of varnish, enamel, shellac, cellulose, oils, etc. Subscribers: A. Gray and J. Tobin. Solicitors: Franks, Charlesley & Leighton, 21 Ely Place, E.C.1.

Greenford Chemicals, Ltd.

Private company. (488,583.) Capital £1000. Chemists, chemical manufacturers, etc. Directors: L. Sargeant, J. W. Hardy. Secretary: M. Morgan. Reg. office: Aintree Road, Perivale, Greenford, Middlesex.

D. J. Simpson (Chemist), Ltd.

Private company. (488,622). Capital £3000. Manufacturing, pharmaceutical, general chemists, etc. Directors: W. Pearce and D. J. Simpson. Reg. office: 101 Warwick Road, Kenilworth, Warwicks.

Potters Hygienic Products (London), Ltd.

Private company. (488,690). Capital £50,000. To manufacture and acquire for resale all classes of chemicals, varnishes and stains, etc. Directors: C. R. Potter, M. M. Potter, H. Flack, W. F. Chapman and G. M. Catanach. Reg. office: 81 High Street, Great Dunmow, Essex.

Spanish Shale Oil

FACILITIES in the Puertollano area of Ciudad Real Province, Spain, where oil shale has been mined and retorted and shale oil refined commercially since 1922, are capable of producing 1.6 million barrels of crude oil yearly, according to a report just released by the U.S. Bureau of Mines. The Puertollano plant, about 125 miles south of Madrid, was one of a number of foreign commercial oil-shale establishments visited by the Bureau's technologists as part of its synthetic liquid fuels programme. The oil-shale deposit contains an estimated 100 million tons of mineable shale, and the present run-of-mine shale has an average assay value of 36 gal. of oil a ton, the report states Spain's total annual demand for crude oil has been 7.5 million barrels in recent years.

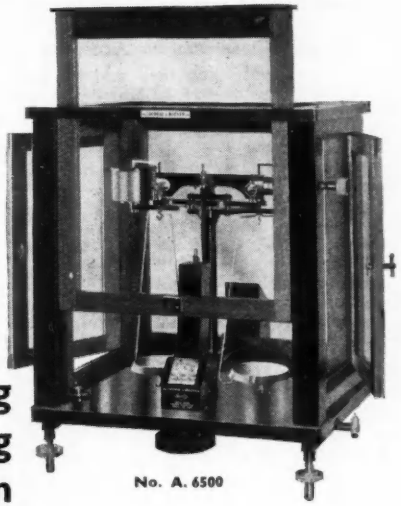
THE STOCK AND CHEMICAL MARKETS

(*continued from page* 794)

duty-free cresylic acid. Pyridines are firmer.

GLASGOW.—Business remains steady in the Scottish chemical market this week although restrictions are becoming more noticeable. The export market is reacting badly owing to the fact that home demands are now taking up a greater proportion of the chemicals which were formerly exported.

THE NIVOC APERIODIC BALANCE



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Patent Processes in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patents Office, Southampton Buildings, London, W.C.2, at 2s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Air-or gas-containing soap and the production of the same.—D. E. Marshall. April 30 1946. 646,060.

Apparatus for melting glass and the like. —Union Des Verreries Mecaniques Belges Soc. Anon., G. Henry, and E. Brichard. Dec. 30 1947. 646,000.

Apparatus for the separation of gaseous or vaporous mixtures.—I.C.I., Ltd., S. Labrow, E. W. Charlton, A. Craig, and E. V. Appleton. June 22 1945. 646,852.

Integral masking of photographic silver-halide emulsions with azo substituted coupling components.—General Aniline & Film Corporation. May 1 1946. 646,867.

Process for producing aldehydes. G. Natta, and E. Beati. Aug. 7 1946. 646,424.

Production of alcohols.—I.C.I., Ltd., N. Levy, and R. K. Greenhalgh. Aug. 15 1947. 646,284.

Production of alcohols.—I.C.I., Ltd., N. Levy, and R. K. Greenhalgh. Aug. 15 1947. 646,497.

Separation of tantalum and niobium in mixtures of their oxides.—Soc. Generale Mettallurgique de Hoboken, and J. P. Leemans. Feb. 18 1947. 646,375.

Photographic developer.—General Aniline & Film Corporation. Feb. 28 1947. 646,376.

Concentration and reduction of iron ore. —Titan, Co. A/S. June 17 1947. 646,289.

Solid detergent masses.—I.C.I., Ltd., and F. J. Pollak. May 31 1948. 646,434.

Manufacture of rubber hydrochloride film for packing foodstuffs.—Wingfoot Corporation. Aug. 1 1947. 646,291.

Diazotype material comprising mono-alkyl and hydroxyalkyl N-substituted-*p*-diazo aniline as light sensitive agent.—General Aniline & Film Corporation. Oct. 13 1947. 646,444.

Manufacture of bimetallic material suitable for use in the production of bearing elements.—Cleveland Graphite Bronze Co. Nov. 3 1947. 646,506.

Production of organohalosilanes.—J. G. Fife. (Dow Corning Corporation). Oct. 28 1948. 646,584.

Production of anthraquinone derivatives. —British Celanese, Ltd. Dec. 22 1947. 646,459.

Process for the manufacture of vitamin-A compounds.—N.V. Organon. Dec. 22 1947. 646,586.

Process for refining, degasifying, and correcting the composition of light metals and light metal alloys under a salt bath. V. Sterental. Dec. 24 1947. 646,587.

Production of organohalosilanes.—J. G. Fife. (Dow Corning Corporation). Nov. 3 1948. 646,466.

Inhibition of foam formation during the manufacture of pulp or paper.—Nopco Chemical Co. Jan. 15 1948. 646,467.

Methods of making porous cemented carbide.—British Thomson-Houston Co., Ltd. March 5 1948. 646,522.

Manufacture of bodies composed predominantly of carbon.—C.D. Patents, Ltd., and A. Hilliard. March 7 1949. 646,524.

Methods of resolving chlorosilane mixtures.—British Thomson-Houston Co., Ltd. March 23 1948. 646,481.

Process for the preparation of dibenzylmethylamine.—Soc. Belge De L'Azote et des Produits Chimiques du Marly. March 23 1948. 646,594.

Sintered metal alloys of the hard metal or hard metal carbide type.—F. C. Potts. (Stora Kopparbergs B/A.). April 3 1948. 646,530.

Manufacture of derivatives of 3 : 5-dioxopyrazolidine.—L. E. Jones. (J. R. Geigy Soc. Anon.). Feb. 24 1949. 646,597.

Generation of hydrogen containing synthesis gas.—Hydrocarbon Research, Inc. April 10 1948. 646,532.

Ultra-violet radiation emitting phosphors.—British Thomson-Houston Co., Ltd. April 14 1948. 646,533.

Manufacture of bodies composed predominantly of carbon.—C.D. Patents, Ltd., and A. Hilliard. March 7 1947. 646,534.

Fluorescent or phosphorescent compositions.—British Thomson-Houston Co., Ltd. April 15 1948. 646,535.

Amended Specifications Published

Synthetic resin moulding compositions and articles made therefrom.—J. Ferguson & Sons, Ltd., and another. 582,807.

Production of colour effects on or in the oxide film of anodised aluminium or aluminium alloy.—W. J. Campbell. 593,239.

Methods and compositions for killing weeds.—American Chemical Paint Co. 598,072.

Heating and reheating of ferrous metals. —J. Miles and Partners (London), Ltd., and another. 606,401.

Process for the recrystallisation of melamine.—Ciba Ltd. 628,631.

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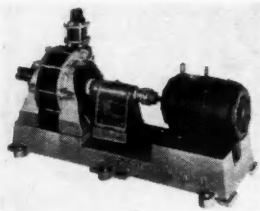

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Model A—No. 3	2"	1½"	55	57	50	22
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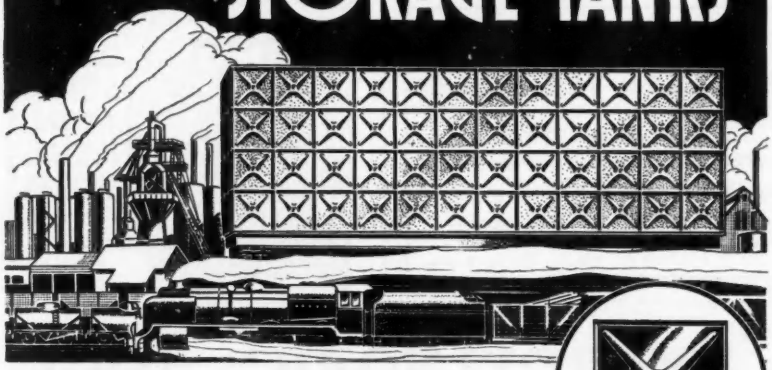

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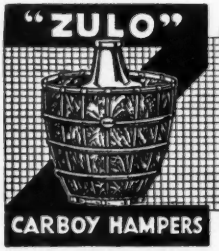

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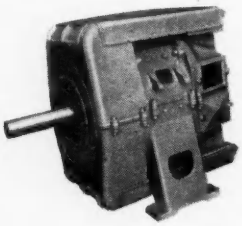

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